RAILROAD GAZETTE

FRIDAY, APRIL 27, 1900.

CONTENTS.

ILLUSTRATIONS: Page

Tests of Air-Braked Trains on Mountain Grades. .. 236
Organization of the Pennsylvania Railroad—With Inset 238
Electrical Tests of the Boston Elevated R. R.. 269
Burning Bituminous Coal Without Smoke on the Southern Pacific System. 270
Dr. Williams on Examinations for Defective Vision 274
70,000-Lb. Capacity Gondola Cars for the Philadelphia & Reading 275

CONTRIBUTIONS:

The Tractive Force of Two-Cylinder Compound..... 265
Preservative Treatment of Ties..... 265

EDITORIALS:

Heavy Freight Trains on the Union Pacific..... 273
March Accidents 273

Page

EDITORIAL NOTES 272, 273

GENERAL NEWS:

Locomotive Building..... 277
Car Building..... 277
Bridge Building 277
Meetings and Announcements 278
Personal 279
Elections and Appointments 279
Railroad Construction..... 279
General Railroad News ... 280

MISCELLANEOUS:

Technical..... 276
The Scrap Heap..... 276
Painting Railroad Bridges 265
The Beira Railroad.... 266
Railroads in North China. 267
The Pittsburgh, Bessemer & Lake Erie..... 268
Train Accidents in the United States in March. 268
National Association of Manufacturers 274
Pneumatic Tools at Home and Abroad..... 274

Contributions.

The Tractive Power of Two-Cylinder Compound Locomotives.

To the Editor of the Railroad Gazette:

Mr. Mellin's explanation, in your issue of March 23, page 179, of his formula for computing the tractive force of two-cylinder compound locomotives is disappointing. He says, in effect, that the high-pressure clearance minus the compression in the high-pressure cylinder is equal to the low-pressure clearance minus the compression in the low-pressure cylinder minus the volume displaced by the low-pressure between exhaust opening and the end of the stroke. Now, the clearance will vary with the design of the engine and the compression, and the point of exhaust opening will vary with the dimensions and setting of the valve. There is nothing in the nature of a compound engine requiring the stated relation to exist, and in the absence of dimensions and data showing it to be true for a given engine or class of engines in practice, the statement of the equation is no better than any other guess.

D. R.

[Had D. R. read carefully Mr. Mellin's discussion printed March 23, the above objection would probably not have been raised. The following letter ought to make the matter perfectly clear.—Editor.]

Richmond, Va., April 17, 1900.

To the Editor of the Railroad Gazette:

Referring to D. R.'s further remarks on my formula for computing the tractive power of two-cylinder compound locomotives, I will only say that a given relationship does exist between clearances of the H. P. and L. P. cylinders when (as is the case in compound locomotives) there is a relation between the cylinders individually and between them and their clearances respectively. The change by setting of the L. P. valve has little or no effect on the final volume, as the compression varies in about the same ratio in direction of maintaining it constant, and it was these facts that led to the substitution of the volume exceeding that of L. P. cylinder by the clearance less compression of the H. P. cylinder, which in a number of cases has been shown to be practically the same as can be obtained by any other means in advance, in designing the engine.

C. J. MELLIN.

Preservative Treatment of Ties.

New York, April 16, 1900.

To the Editor of the Railroad Gazette:

I took up with much interest the article by Mr. Chanute in your issue of April 6, but did not get the information that I hoped to glean as a result of Mr. Chanute's recent extensive European trip. The whole article can be summed up in the statement that creosoting, if conscientiously done and proper amounts of the dead oil of tar are injected, is the best known method of wood preservation. But we all know that. There is no argument on that score. Creosoting is the method par excellence—providing it is properly injected in seasoned timber, and in ample quantity to thoroughly saturate it. But who can afford to pay for this treatment? Mr. Chanute says that in Germany, where the dead oil of tar, the fuel (they use principally the bark stripped from trees, etc.) labor and everything else, is much cheaper than in this country, the cost is 54 to 59c. per tie; while in France, under equally favorable conditions compared to our own, the cost is 64c. per tie. In this country this same grade of work would bring the cost to about 80c. per tie, or even higher. No road could afford to spend this amount of money on a tie, besides first cost, even on a certainty against decay, as many causes other than decay necessitate renewals.

It is high time that some move be made in this country to check the consumption of timber, particularly by railroads. Within the next five years timber will have doubled in cost. The increase in cost of ties from 1898 to 1899, and again from 1899 to 1900 (averaging about 40 per cent. on former cost), is but a forerunner of what we may expect. Forests have been depleted, and the comparatively small woodlands remaining, are getting into the hands of a few owners, who are not tying up their capital for their health. The increase in cost of timber during the past two years must not be looked upon as consequent on the general boom throughout the country; it is the natural working of supply and demand when supply is controlled by a few. Mark this prophecy!

In the most recent publication on wood preservation (the paper by Mr. W. W. Curtis, published by the Am. Soc. C. E. some time in the fall of 1899) there appears a letter by Mr. Chanute, the last paragraph of which states: "In the hope of learning still more about the anomalies of various woods, and the best methods of treating them, the writer is now about to visit Europe, where far more experience has been accumulated than in America, and he regrets that the present publication of this valuable paper will prevent this discussion from containing the results of the pending tour of observation." Is this article the result of Mr. Chanute's tour of observation? I have seen nothing else in print by him, and I am a close reader of such papers and contributions. Does Mr. Chanute infer that nothing in the way of improvement has been made in wood preserving during the past 50 years even in Europe?

During the past 5 or 6 months I have noticed in the advertising pages, and in several articles of reading matter in the Railroad Gazette, accounts of a process of wood preservation being exploited by a company in this city, known as the Hasselmann process, and great claims are made for it. German experts have written opinions, which, if correct, place it ahead of every method of wood preservation, even creosoting of the best kind. The company controlling the American patents makes claims of superiority, and, what is more, stands ready to prove these claims. Plants are now in operation in Germany (at least six), in Austria, Austro-Hungary, England, Russia, France (now under erection), etc. The Bavarian Government Railroad has been treating by this process for the past two or three years, and has a contract to continue with the process until 1905. For the past two years they have treated about 200,000 ties annually, and recently put up another cylinder, boiler, etc., to increase the output of ties treated by this process. Surely this company cannot be making these broad claims without being in a position to substantiate them.

M. OF W.

Painting Railroad Bridges.*

It might be possible to so treat the metal, after it leaves the rolls and before it leaves the mill, as to make it impervious to the action of the destructive agencies; but the cost of such treatment, on account of the labor charge, due to the delay at the mill, and the fact that it has yet to go through the shops, makes it impracticable. . . . Plate girders appear to suffer much more than trusses, and through bridges much more than deck bridges, the former being due to the greater area exposed, and perhaps to the presence of more mill scale, and the latter to the fact that the deck girders are better sheltered from the rain and sun and sparks.

As painting is the only remedy so far in use against oxidation of bridges, the question of what paint to use is the ever-recurring one to the officer in charge of construction and maintenance. . . . If he seeks the solution of the problem for himself, he finds many difficulties, the chief one being the time necessary to make the test in actual practice and the consequent difficulty of proper records. . . . The laboratory test is a short cut, but is not entirely conclusive on account of the impossibility of bringing to bear all the destroying agencies which are to be encountered in practice.

The writer recently undertook a laboratory test of twenty different kinds of paint, which will here be briefly described, but he is free to confess that he does not consider it conclusive.

Twenty discs of sheet iron, six inches in diameter, were hammered until each became a saucer about half an inch deep. The inner surface of each saucer was divided by radial lines into three equal sectors. After being thoroughly cleaned, each saucer was painted all over one coat of paint. When this coat was thoroughly dry, two of the radial divisions, or sectors, were given a second coat. Again, when dry, one of the radial divisions, which had already received two coats, was given a third coat. In this manner one-third of each saucer received one, two, and three coats, respectively.

Each saucer had about a tablespoonful of locomotive sparks placed in it and water poured over them until about three-quarters full. They were then set away. This was done on June 1, last. The saucers were watched, and as each became dry it was refilled. On November 1 all saucers were removed and submitted to one of our members for classification with regard to the rust-resisting qualities of the paints. After careful examination he arranged the saucers in a row in the order of their superiority, and then called in another member, who, on looking over them, approved his classification. Neither one knew the names or kind of paint used. These saucers are presented for inspection. The writer, equally ignorant, also made a classification, marking each third of each saucer whatever percentage of 100 his best judgment dictated. A comparison of the two results is given in the table:

Comparison of Paints.—McDonald.

Number of sample.	Rank by member.	Rank by writer.	Kind of Paint.
1	9th	6th	Dixon's Silica Graphite Ground in Oil.
2	11th	10th	*
3	7th	8th	*
4	17th	8th	Allen's Antirust Japan.
5	2d	2d	Penn. Standard Rubber Paint.
6	3d	3d	Red Lead and Oil.
7	14th	9th	Lampblack.
8	5th	4th	National Paint Works, No. 800B.
9	15th	10th	Mexican Graphite.
10	13th	11th	Ferrubron.
11	19th	12th	*
12	4th	5th	*
13	10th	10th	* [tector.
14	1st	1st	National Paint Works, No. 500 Metal Pro-
15	16th	9th	Princes Mineral Brown.
16	20th	13th	Princes Red Oxide.
17	8th	6th	National Paint Works, No. 31, Special Dark.
18	6th	7th	National Paint Works, No. 32, Pure Graphite.
19	18th	9th	National Paint Works, No. 700B.
20	12th	10th	American Lucol Co. Durax.

* Proprietors do not desire publication of tests.

All proprietary paints were furnished by the manufacturers especially for the test, except Dixon's Silica Graphite, which was purchased. All other paints were mixed by the Master Car Painter of the Nashville, Chattanooga & St. Louis according to the best practice, and all were applied by him.

The only conclusion to be drawn from the results is that none of the paints submitted withstood the test, and yet it is of the same character, although perhaps a little more severe, as the one to which railroad bridges are continually subjected.

The importance of selecting a good paint is emphasized by the fact that the cost of its application is from one to five times the cost of the paint. . . . A paint requiring only one coat is therefore to be most desired.

In nearly all the catalogues of paint manufacturers is found, among other things, the statement that the iron must be thoroughly cleaned. This is, of course, true, but few people realize the difficulty of cleaning iron which has begun to rust so that it will be entirely free from oxidation, and yet no paint will protect the metal unless it be done. The only entirely successful method known to the writer is the sand blast, which, though expensive in first cost, is the most economical in the end. . . .

Of course we have no means of knowing without costly investigation what kind of oil is used in the proprietary paints. Many of them contain no linseed oil, being made of asphalt and coal tar. Another requirement which is insisted on by those who claim to know how to mix paints is that the oil used shall be pure linseed oil, and it is generally specified that it shall be boiled. Professor Sabin, in his very interesting discussion on Mr. Gerber's paper on painting iron structures, read before the American Society of Civil Engineers (June, 1895), states in substance that "the best quality of oil is obtained from the pure seed at a not very high temperature; that this oil is mixed with water and mucilaginous substances which separate by long standing. The oil, however, is usually not allowed to stand long, being marketed with the impurities in it. Much of the seed is impure, being mixed with other seeds, which is injurious. The pure oil is mostly absorbed by the varnish trade, bringing a high price, resulting in the sale of the impure oil to the general trade. . . . It is difficult to detect adulterations in boiled oil. The most common form of adulteration is to add about 30 to 50 per cent. of a mixture of mineral oil, rosin, and driers, or a like amount of fish oil." There are many other adulterations of paints mentioned in the paper, all of which go to show that to obtain good materials one must have the whole process of their manufacture scrutinized carefully by an expert chemist. . . . The user of good paints must make up his mind to pay a good price

*By Hunter McDonald, Chief Engineer, Nashville, Chattanooga & St. Louis Ry. Extracts from a paper before the Engineering Association of the South.

for his material, and it is doubtful if absolute purity is obtainable at any price. . . . The writer secured from a large dealer samples of his best raw and boiled linseed oil, made in St. Louis, and submitted them to Mr. Hollinshed, of Vanderbilt University, for analysis. He reports a plentiful and skillful adulteration, the principal adulterant being probably whale oil. . . .

The use of raw oil on railroad bridges is objectionable on account of its drying so slowly as to allow cinders to become imbedded in the wet paint.

It might be inferred that the writer does not believe it possible under present conditions to preserve iron and steel from rust. It is not desired to leave such an impression, but rather to emphasize the fact that it requires the most careful attention and much greater expense than is now ordinarily given to such purpose. This expense, however, will be found money well invested if it diminishes the number of times railroad bridges have to be scraped and painted.

The Beira Railroad.

The Beira Railway was the outcome of an agreement made between Great Britain and Portugal on June 11, 1891, mainly for the purpose of fixing the respective frontiers. Under the agreement the Portuguese Government undertook the construction of a railway which would connect Rhodesia with the sea, at Beira. The original concession was granted the Mozambique Company, but eventually it was transferred to the Beira Railway Company, which was registered in London in July, 1892.

The complete line up to New Umtali, the frontier then fixed, was finished by July, 1898. The total length of the Beira line is 203 miles, a greater distance than was originally contemplated, partly because the boundary between the British and the Portuguese spheres of influence had, in the meantime, been moved seventeen miles westward, and partly because of the detours which had to be made owing to the hilly nature of the country. The line rises steadily from Beira until at Umtali it reaches an elevation of 3,450 ft. In the circumstances it is not surprising that the average speed for passenger trains is only 12 miles an hour, and for goods trains 10 miles an hour. The complete journey from Beira to Umtali generally takes two days, a night being spent at a stopping place en route.

At Umtali the line connects with that of the Mashonaland Railway Company, which runs thence to Salisbury, the capital of Rhodesia, a distance of about 170 miles. The raison d'etre of the whole line from Salisbury to Beira is the development of Rhodesia, which thus gets a 373-mile railway journey to the sea on the east coast as an alternative to the 1,350 miles from Bulawayo to Cape Town on the south. At present there is no railway between Salisbury and Bulawayo, a distance of 280 miles.

The Beira-Umtali line was originally constructed on a 2-ft. gage, the carriages overhanging the wheels to about the same extent on each side. The Umtali-Salisbury line, however, was made on the 3 ft. 6 in. standard of the Cape Railway system, and the Beira Railway is now being relaid, so that it now corresponds with the same standard, with the exception of some sixty miles.

The Beira Company has forty-eight engines available, the rolling stock is constantly being increased, and, though the present supply of carriages is limited, there is an abundance of trucks which, with a covering to protect against the sun, seem to be preferred by the average soldier in his journeys across country to the ordinary railway carriage, and would no doubt be especially preferred to the diminutive carriages still run on the 2-ft. section of the Beira line. The only difficulty that is anticipated is in respect to the conveyance of horses, but there is a certain number of horse boxes available, and there are also some covered-in goods trucks, which might be adapted for the purpose. Happily, too, the line is under the charge of an agent, Mr. A. L. Lawley, who possesses indomitable energy and resource.—The Times (London).

Tests of Air-Braked Trains on Mountain Grades.

As said in our issue of April 13, the recommendations of the Air Brake Association Committee in regard to handling freight trains on mountain grades were based on careful tests made on a western road. The tests were not fully given in the report, but the complete record has been published by the Westinghouse Air Brake Company in pamphlet form as "Bulletin No. 7." It is the first information of the kind that has been made public and is especially important in view of the increase in the size of trains, and the chances for improvement in the operation and maintenance of brakes as shown by this investigation.

A dynamometer car attached to the last air-brake car in the train was used and the apparatus included a speed recorder, two recording pressure gages, one connected to the train pipe and one to the brake cylinder of the test car, a simple gage attached to the auxiliary reservoir and a slidometer. All trains tested were supplied with 9½-in. air pumps and large capacity main reservoirs, and the improvement in the ability to recharge and maintain pressure was so marked that there is no doubt that the work done by the air-brakes in many of the tests could not have been accomplished without the aid of hand brakes under the old conditions of small pumps and small main reservoirs. The tests demonstrated the wisdom of increasing the air supply and storage on all engines hauling long, heavy trains, particularly those working on grades, or where the winter temperature is low. Extracts from the report follow.

Trains and Cars Tested.—The total number of trains tested was 30. The average train contained about 33 cars, the shortest 25 and the longest 53. Of these trains 23 were given standing brake tests, while seven of the latter were given thermal tests in which the relative amount of work done by each brake is determined at the foot of the grade by the comparative temperature of the wheels, this being the most reliable of all tests. In every instance it indicated defective brakes not found by standard tests. Twenty-three trains contained 749 cars, of which 655 (87.3 per cent.) were air braked, 53 were non-air cars and 41 were fitted with train pipe only. One hundred and twenty-seven (19.3 per cent.) of the air brake cars had bad order brakes, and out of the 749 cars but 70.5 per cent. had air brakes in good order. Three of the 30 trains, being coal trains, had no foreign cars. The remaining 27 trains contained 903 cars, of which 262 (29 per cent.) were foreign.

Of the 262 foreign cars, 198 (75.5 per cent.) were air braked, while of the 641 home line cars in the same 27 trains, 587 (91.5 per cent.) had air brakes. Thirty-nine of the home line and but two of the foreign cars were fitted with train pipe only.

Twenty brake-tested trains contained 475 home line and 189 (39.7 per cent.) foreign cars. Of the home line cars 428 (90.1 per cent.) were air braked, while on the foreign, 144 (76.1 per cent.) were so. Of the 428 home cars, 67 (15.6 per cent.) had brakes in bad order, while 46 (31.9 per cent.) of the 144 foreign cars had defective brakes. In the 27 trains the air was cut off from the caboose with 19 by foreign non-air cars. Only 3 of the 27 were cut in to the caboose. Of the 144 foreign cars, 95 (65.9 per cent.) belonged to railways, while 29 (63 per cent.) of the 46 foreign cars with defective brakes belonged to the same owners. In 22 trains containing 617 air brake cars, 277 (44.8 per cent.) were fitted with the 15-lb. pressure retaining valves.

Driver and Tender Brakes.—Of 30 engines tested, the driver brake was inoperative on 10, and the tender on 3. However, the latter number does not comprehend 4 others with 12-in. travel which permits the piston to bottom on the brake cylinder head. In addition to these, 4 tender brakes had 11-in. and 2 had 10-in. piston travel. The extreme limits of variation for such would be from 6 to 9 in. Theoretically the total driver brake piston travel should be close to the limit just given for the tender brake, but as excessive tire heating might result in holding some trains down the grade we may, in the absence of other special provision than now had to guard against such contingency, consider a total of 12 in. to 14 in. as safe for grade work.

With No. 29, the loaded train (see Table No. 1), the quick action train brake force of 19 per cent. would be reduced, by the weight of the engine and tender with no brakes, to 17 per cent. But with 75 per cent. of the weight on drivers and 80 per cent. of the empty tank weight it would be raised to 22.4 per cent. With the same class of engine and variation in its brake condition, the gain or loss to the train will be proportional to the relative weights of engine and train, this being indicated in the latter part of Table No. 1. The value of the driver and tender brake of a modern mountain grade engine is well shown when stated that the resultant brake force is equal to that got in full service application from 7.3 freight cars of 30,000 lbs. light weight, braked at 70 per cent.

With No. 29, car brakes as found, tender brake at 80 per cent. of light weight, driver braks cut out and "water brake" holding the engine, tender and one car (a moderate amount), the quick action brake force of the train would have been 24.4 per cent. However, the actual brake value would be increased more than this indicates on account of the greater retardation offered while recharging brakes.

Comparative Brake Shoe Pressures.—With the same classes of engine and car as mentioned, the full service brake force, with no retaining valves, gives a shoe pres-

Table I.—Results of Air Brake Tests on Grades.

Number of Run.	Temperature in Degrees.	Number of Cars. In Train.	Number of Cars. With Air Brakes.	Number of Cars. With Air Brakes in Good Order	Tons Weight of Train. All Cars Empty.	Tons Weight of Train. All Cars at Capacity.	Tons Weight of Train. By Train Manifest.	Speeds and Resultant Energies. Average Speed, M. P. H.	Energy, Million Ft.-Lbs	Maximum Speed, M. P. H.	Energy, Million Ft.-Lbs.	Average Maximum Speed, M. P. H.	Energy, Million Ft.-Lbs.	Average Minimum Speed, M. P. H	Energy, Million Ft.-Lbs.	Per Cent. of Brake Power to Train Weight. With Brakes as Found. Full Service.	With Brakes as Found. Quick Action	With all Brakes in Good Order. Full Service.	With all Brakes in Good Order. Quick Action.	Brakes on all Cars and in Good Order. Full Service.	Brakes on all Cars and in Good Order. Quick Action.	Brakes as Found—Train Empty and Quick Action.	All Cars Braked—At Capacity and Quick Action.	Remarks.
																								All trains tested as found. All air-braked cars considered leveraged to 70 per cent. of light weight. Driver brake power 75 per cent. of weight on drivers. Tender brake power 80 per cent. of light weight. Weights of engine and tender with one-half capacity of coal and water.
2	5	27	24	18	378	1,043	849	20.0	23.3	28	44.5	24.0	32.7	16.5	15.4	17.2	20.7	23.4	28.1	25.9	31.1	46.5	25.3	Driver and tender brakes not holding.
4	28	30	26	23	410	1,073	818	23.0	28.4	35	67.0	28.5	44.4	19.0	19.7	23.0	27.6	26.2	31.5	29.2	35.1	54.9	26.7	
6	28	31	29	23	431	1,176	866	19.5	21.0	30	52.1	24.5	34.7	15.0	13.0	21.9	26.3	27.4	32.9	29.0	34.8	52.9	25.6	
8	-9	37	33	22	516	1,346	1,013	18.0	21.9	31	65.1	24.0	39.0	14.0	13.2	16.9	21.5	26.9	32.3	29.6	35.6	42.2	26.8	Excessive leakage from train pipe.
10	-26	28	25	17	381	1,016	795	14.5	11.1	23	28.1	19 0	19.1	10.0	5.2	16.7	20.1	25.2	30.3	28.0	33.6	59.9	26.4	Driver brake leaked off.
12	-6	31	20	14	406	1,041	795	17.5	16.2	26	35.9	21.5	24.5	13.5	9.6	10.0	12.0	21.7	26.1	29.8	35.8	35.6	27.8	Driver brake cut out.
14	30	53	46	40	668	1,808	1,598	12.0	15.3	20	42.6	16.0	27.3	7.0	5.2	18.6	22.4	21.5	25.8	24.3	29.2	53.7	25.8	
17b	36	26	22	18	359	949	636	20.0	17.0	30	38.2	25.5	27.6	16.5	11.5	23.3	28.0	29.1	35.0	32.9	39.5	49.5	26.5	Driver brake not holding.
17f	46	37	33	24	498	1,288	1,082	18.0	23.4	28	56.7	23.0	38.2	14.0	14.1	18.1	21.8	24.5	29.5	26.8	32.2	47.4	27.0	" " "
19	44	35	32	25	459	1,194	1,076	22.0	34.8	32	73.6	29.5	62.6	15.0	16.1	17.7	21.3	23.0	27.7	24.8	29.8	50.0	26.9	Driver and tender brake not holding.
21	43	40	38	30	566	1,466	1,125	21.0	33.1	34	86.9	31.0	72.2	16.0	19.2	22 9	27.5	28.4	34.1	29.4	35.3	54.4	27.2	Driver brake not holding. Nine poor car brakes here considered good.
23	42	37	33	27	524	1,339	1,096	19.5	27.8	27	53.4	24.5	43.9	14.5	15.4	19.1	23.0	25.5	30.7	27.8	33.4	48 1	27.4	Driver and tender brakes holding poorly.
25	31	28	28	25	417	1,292	1,263	22.5	42.5	30	75.5	25.5	54.6	16.5	22.8	17.0	20 5	19.2	23.1	19.2	23.1	62.1	22.5	Two poor car brakes here considered good.
27	32	32	32	24	420	1,245	1,252	17.5	25.6	25	52.3	22.0	40.5	14.0	16.4	15.1	18.2	19.5	23.5	19.5	23.5	54.2	23.6	Five poor car brakes here considered good.
29	26	25	23	20	357	1,082	1,073	19.5	27.2	25	44.6	21.5	33.1	17.5	21.9	15.8	9.0	18.2	21.9	19.3	23.2	57.2	23.1	Driver brake holding poorly. Three poor car brakes here considered good.
2	5	27	24	18	498	1,163	969	20.0	25.9	28	50.8	21.0	37.3	16.5	17.6	15.1	18.1	27.5	33.0	29.3	35.2	...	..	Effect of locomotive weight and brakes, engine and tender.
*31	43	40	38	30	695	1,595	1,254	21.0	36.9	34	96.9	31.0	80.5	16.0	21.4	24.4	25.7	29.7	35.7	30.6	36.8	....	....	" " " " " "
*25	31	28	28	25	546	1,421	1,392	22.5	47.1	30	83.7	25.5	60.5	16.5	25.3	19.3	23.2	21.3	25.6	21.3	25.6	...	....	" " " " " "
*27	32	32	32	24	549	1,374	1,381	17.5	28.2	25	57.9	22.0	44.6	14.0	18.0	17.5	21.1	21.6	25.9	21.6	25.9	..	....	" " " " " "
*29	26	25	23	20	486	1,211	1,202	19.5	30.4	25	48.4	21.5	37.0	17.5	24.5	15.2	18.3	20.8	25.0	21.8	26.2	....	....	

*Condition of driver and tender brakes "as found" indicated for each train previously under head of "Remarks."

Table II.—Effect of Retaining Valve.

Average Pressure Test Car Cylinder. No. of Run.	No. of Brake Applications.	Average Cylinder Pressure.	Average Pressure Held by Retaining Valve. No. of Run.	No. of Brake Applications.	Average Cylinder Pressure.
2	12	57.0	2	12	17.9
6	10	46.5	4	5	17.9
10	27	57.2	6	12	17.6
12	19	57.0	8	19	17.9
14	12	48.9	10	27	19.2
14	11	48.2	12	19	19.5
14	6	42.2	14	14	19.7
17b	6	51.4	14	11	20.6
19	7	55.5	17b	5	20.3
19	3	42.6	17f	6	17.8
21	10	54.3	19	6	17.5
21	3	44.6	21	8	17.5
25	7	58.7	23	8	18.3
25	2	41.7	25	6	17.4
27	12	58.5	27	12	20.8
29	18	54.0	29	17	22.5
29	10	40.5			

New retaining valve. Standard 15-lb. type. Pressure retained about 17½ lbs.

sure of 16,470 lbs. for the drivers, 3,780 lbs. for the tender and 2,150 lbs. for the car, the latter being 2,400 lbs. with the pressure retaining valve. It will thus be seen that while the area to be heated is considerably larger with the driving than with the car wheel, yet a pressure of nearly seven times greater must result in a much higher temperature with the former where each does its proportion of work down the grade. However, the degree of heat attained in any wheels by brake application is principally governed by speed.

Speed Just Beyond Summit.—Too high a speed before the first brake application was almost invariably permitted on passing the summit. Hence, if, for any reason, the engineer could not control the train's speed, that attained before this was realized, would give trainmen a poor chance of getting the train under control with hand brakes, particularly with coal trains, owing to the concentrated weight and difficulty in passing from car to car. In the two days previous to the first trial trip down Rocky Mountain grade No. 1, three trains had been unable to make the stop to cut out the helper. While the snow and extreme cold were largely responsible for the lowered brake efficiency that undoubtedly existed, yet it was demonstrated that by operating the driver brake, using the pressure retaining valves, keeping the speed down and train thoroughly recharged, the stop at the place to cut out the helper could readily be made.

The most critical period is the first mile or mile and a half after passing the summit, particularly where the summit is in or immediately followed by a long tunnel, which occurs with the majority of these heavy grades. No previous brake test should justify the engineer in permitting other than a low speed, before the ability or not to control the train with air brakes has been demonstrated by trial.

The next serious error noticed was in the average speed down the grades. It should be plainly apparent that no hard and fast rule can be established for this that would insure an equal degree of brake safety with various trains; also, that while, as a precautionary measure, a certain limit may be established, yet the average speed within such limit must be demonstrated for each train by trial immediately on commencing the descent. A few engineers displayed excellent judgment in this, but not all.

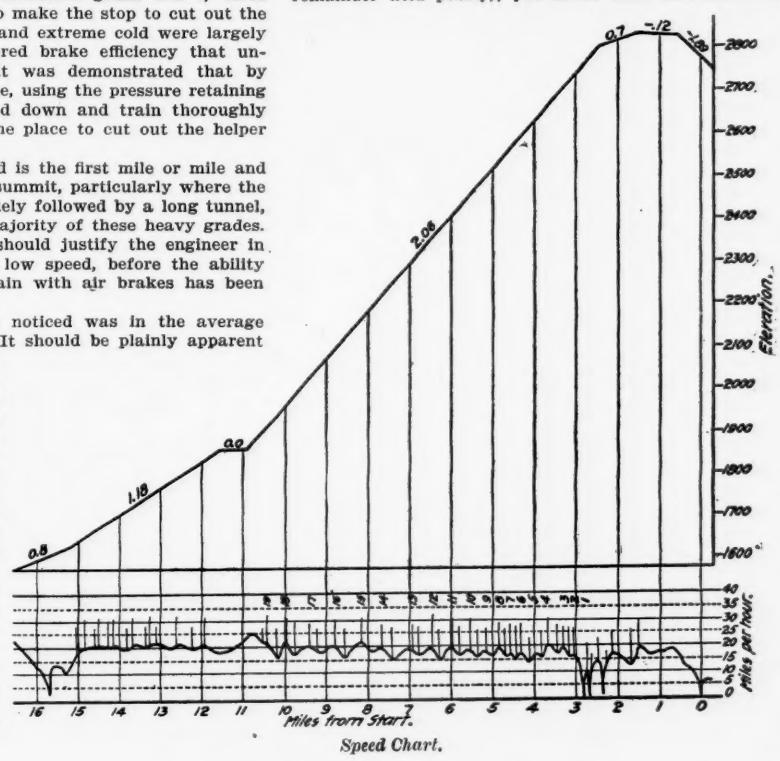
Nor are these the only serious speed errors; for a comparison of the average, the maximum and the average maximum speeds will demonstrate that even where the per cent. of brake power to total weight and the condition of brakes are similar, yet the brake safety of trains, so far as speed is concerned, is not necessarily indicated by the average speed, but rather by the maximum, as this is generally attained on the most difficult portion of grade. Referring to Table I, trams 2 to 6 inclusive were held down Rocky Mountain grade, No. 1, 8 to 14 inclusive down Rocky Mountain No. 2, 17b down Rocky Mountain (West) No. 3, and 17f to 29 inclusive were held down the Cascade Mountain. Nos. 25, 27 and 29 were coal trains and the others merchandise.

Of the three coal trains just mentioned, No. 27 was the most difficult to control, although held with safety. This was due to the lesser proportion of 15-lb. pressure retaining valves, the lower per cent. of brake force to load, the greater number of cars and the larger number of poor but not useless brakes, considered as good in determining the per cent. of brake power to load. Twenty-five per cent. of the train brakes were useless and 20.8 per cent. of the remainder held poorly.

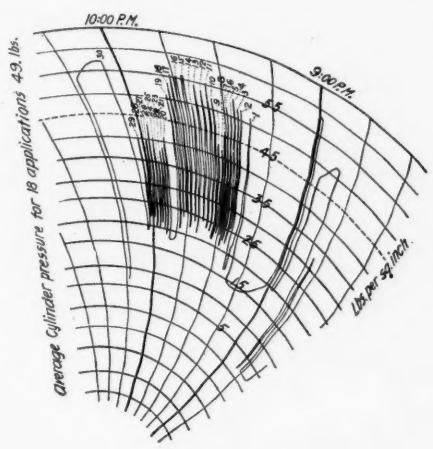
While in determining the percentage of brake force to load it was assumed that all air-braked cars were leveraged to 70 per cent. of the light weight (and it is known that this was true of all cars in No. 25 and the majority in No. 29), yet in No. 27 there is good reason to believe that the percentage was appreciably lower than assumed. Had the average speed of No. 27 been permitted to go as high as either Nos. 25 or 29, or its maximum as high as the former's, there is no doubt that hand brakes would have been required to assist.

No. 29 was held down the grade by one of the parties conducting the tests. In view of his being out of practice in train braking, that it was night and he was not acquainted with the characteristics of the grade, the possibilities of improvement in the work of engineers is especially apparent when it is considered that the coal trains were by far the most difficult to control of all held down this grade.

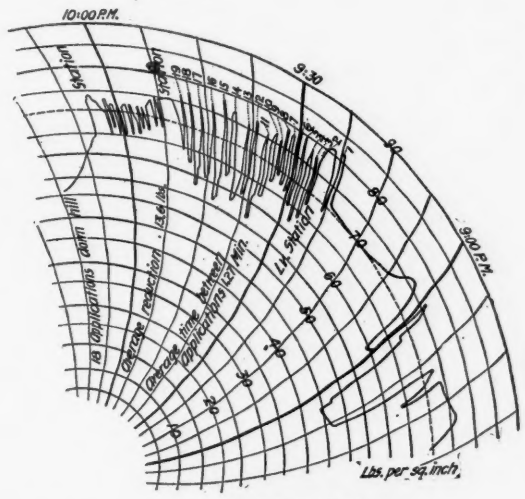
Effect of Large Capacity Cars.—No. 25 was an excellent example for illustrating the effect of large capacity cars on train brake safety. The average maximum and maximum speeds were all higher than good judgment should dictate for such a train (10 per cent. of the train brakes were useless and 8 per cent. of the remainder held poorly), yet at no time was difficulty experienced in holding the train, though of necessity the distance required for making a stop would have been much greater than if the speeds mentioned were nearer alike and all lower. The feature that contributed mainly to the excellent holding of this train were the relation between the brake force and load and that, with one exception, all cars were fitted with 15-lb. retaining valves, the majority of which held as they should.



Speed Chart.



Brake Cylinder Chart



Train Pipe Chart.

Chart No. 29.

This chart shows the best handling of the train of any of the charts, the average speed being 19½ miles per hour, the total average variation being four miles per hour. As will be seen by the train-pipe chart, the recharge was made each time in the full release position. The recharges were frequent and a high average pressure was maintained. These recharges were made with a view of moving the triple valve to the application position before the pressure-retaining valves had time to reduce to the limit, 15 lbs. Thus a 15 lbs retaining valve was virtually made to do the work of a 22 or 23 lbs. valve as shown by the brake cylinder chart and Table II., which proves the practice to be a good one.

Pressure Retaining Valve.—With an adequate percentage of brake force to load, the remaining requisites for good results, outside of handling, are, first, ability to obtain the cylinder pressure on which this is based and without, for a reasonable period, serious loss by leakage from brake cylinder pressure; and, second, to be able to fully recharge the auxiliary reservoirs before the train speed has exceeded to any material extent the average desired. The first was provided for in No. 29 through the leverage and condition of brakes, but the latter might have been better. The second depends on the air supply, which was ample, and the pressure retaining valve.

The old type of pressure retaining valve has a large retaining exhaust port, originally held but 10 lbs., which through the wear from years of service has reduced to about 8 lbs., and has not the strength of construction to resist abuse found in the present standard. The latter has a $\frac{1}{7}$ in. retaining exhaust port and holds 15 lbs. after years of wear, and is less liable to be seriously damaged by the abuse now incidental to use.

The best evidence of its effectiveness is demonstrated by the considerable fall in speed following release that was several times noticeable in No. 29, but which is almost entirely absent with all other trains. The extent to which this will occur with any one train under like conditions of grade and curvature is dependent on the average pressure in brake cylinders at the time of recharging.

By reference to Table II it will be seen that it is possible to increase the value of the retaining valve beyond that at which it is adjusted. The valve on the test car being new, held about 17.5 lbs., all new ones holding a little over the standard amount. The means by which a greater amount than normal can be held, this being particularly noticeable in No. 29, is by recharging and reapplying quickly, thus closing the triple valve exhaust port before the pressure has reduced to the amount held. The pressure in the cylinder at the time of recharge also affects the results. Where leakage would affect the amount retained the described method will render such defect less serious in its results. The common supposition that retaining valves hold better standing than running is contradicted by the test car record, it indicating the opposite. The solution is that the resultant jar is sufficient to seat the valve accurately, but which is less likely to take place standing. The loss occasioned by jarring when running is inconsiderable for a greater period than can be employed in recharging on any considerable grade.

Hand Brakes.—Except on a few trains during very cold weather, and with which hand brakes were used only a very short distance, the trains were held down the heavy grades by the air brake alone, the exceptions noted being generally so unfavorable and the possibilities of improvement so considerable we can state with assurance that it is possible with ample safety to depend on the air brakes alone, and that this is so even now unless a large number of air brakes are defective or the proportion of non-air cars is excessive.

Piped and Non-Air Cars.—At present, however, as is shown by Table No. 1, the number of cars without air brakes too often materially reduces the otherwise possible brake force, the foreign cars, on trains tested, being the greatest offenders. However, the cars fitted with train pipe alone are only better inasmuch as they are so far prepared for the application of air brakes. Some coal cars are piped and it is understood others are being similarly prepared. This is a most serious error as such is the service in which the loss of even one brake can be least afforded.

Water Brakes.—While the water brake was not used with any train, yet the satisfactory results obtained since with the compound engines, and that already known of simple engine water brakes, have an important bearing on the safe handling of trains down grades.

Operation.—Owing to the Federal law and to reduced wheel sliding and cracking, trains should be controlled without aid from the hand brakes, air brakes alone being used. That this may be accomplished with an ample degree of safety on heavy descending grades, a certain proportion of the cars must have good order air brakes in use. Just what this proportion should be depends mainly on how near to capacity the cars are loaded, the speed, type of pressure retaining valve and the leverage of cars. The length of train is also quite important. For trains loaded near to capacity, such as coal and wheat, it is recommended that down the 2 per cent. grades, at least 90 per cent. of the cars should have good order brakes in operation; and that for other freight trains the minimum limit should be about 75 per cent. The average speed should not exceed 18 miles an hour. The safe speed within this limit should be determined by the engineer after he has started down the grade, and he should be held responsible for letting a train get from under control, as the water brake can be used if necessary, and thereby require no hand brakes.

The old rule that the speed must not "exceed" 15 miles an hour is palpably a dead letter, for two reasons, viz.: that it would result in too low an average speed, and for the very pertinent one that road men are not encouraged to adhere to it. A train loaded close to capacity or one with comparatively few good air brakes may be rendered quite safe by holding the speed down low.

In order to remedy a trouble the cause must first be discovered; and to assist in this, conductors should be required to report by wire any trains difficult to hold, and, on arrival at terminals, to furnish a memorandum of the number and initials of cars that, immediately on reaching foot of a grade, had either cold wheels or materially cooler ones than the average of the train.

Maximum and average maximum speeds should be maintained close to the average speed, and the available brake force, so far as air pressure is concerned, be held close to the maximum. To accomplish the foregoing, long holds must be avoided, as brake cylinder leakage and resultant large amount to be replaced in recharging preclude the desired results. Chart No. 29 is reproduced, as it shows the uniform speed that can be held by this method of operating the brakes.

Railroads in North China.

The following, dated Pekin, February 26, 1900, has been received from Minister Conger:

The Tientsin-Shanhaikuan-Niuchwang branch of the Chinese Imperial Railway is now completed and will soon be opened to general traffic. The distance from Tiensin to Niuchwang is 348.63 English miles. The line from Tientsin to Chinchow, 268.63 English miles, over which trains have been running for some months, is said to pay 14 per cent. on the whole capital invested. It is expected that when the entire

line is open, the road will pay a return of 30 per cent.

The Chinese Eastern Railway (Russian), which is now completed from Port Arthur as far north as Moukden, connects with Niuchwang at Ta-shi-chiao, thence to Port Arthur—distance 180 miles. Owing to the danger of running trains in China during the night, the time between Port Arthur and Pekin will be about three days.

The Russians are working with feverish activity to finish the road from Moukden to Vladivostok, and it is thought that Russia's two great strategic points in the Far East—Port Arthur and Vladivostok—where she is said to have garrisons variously estimated at from 120,000 to 200,000 men, will be connected by rail not later than August of this year.

Trains are now running over the Siberian Railway as far east as Stretensk, on the River Shilka, a tributary of the Amur, from which place the river route must be used to arrive at Khabarovsk, whence the Uszuri section of the railroad runs to Vladivostok, thus completing for the present the great enterprise begun in 1891 and establishing uninterrupted steam communication between western Europe, St. Petersburg, and the extreme eastern limits of the Russian Empire on the Pacific coast.

At present, the schedule running time is: St. Petersburg to Lake Baikal, nine days; Lake Baikal to Stretensk, three days; by river to Khabarvosk, six days; and to Vladivostok, one day; total, nineteen days.

The section of line between Stretensk and Vladivostok is now partly completed, and it is expected that the whole line will be open in about eighteen months.

Organization of the Pennsylvania Railroad.

[WITH AN INSET.]

The Inset published with this issue of the Railroad Gazette is a copy of a diagram, made in 1894, showing in graphic form the official relations, one to another, of all the general officers and heads of departments of the Pennsylvania Railroad, including, as will be seen, the officers of the Northern Central, the Philadelphia, Wilmington & Baltimore and the West Jersey & Seashore (then called the West Jersey and Camden & Atlantic divisions). This diagram is self-explanatory, but it should be noted that the changes in vice-presidencies consequent upon the death in 1897 of Mr. George B. Roberts have not, generally speaking, changed the duties of the men who were promoted. Mr. John P. Green, who was Second Vice-President, is now First Vice-President, but his duties remain the same as those indicated by the arrangement on the diagram. In like manner Mr. Charles E. Pugh, now Second Vice-President, performs the same functions as when he was one degree lower. The new Third Vice-President, Mr. S. M. Prevost, took the duties of the First Vice-President, except that transportation matters, which formerly went through the First Vice-President to the Third, now form no part of Mr. Prevost's duties. A Fourth Vice-President, Mr. Samuel Rea, has been appointed. He has general charge of the promotion of new lines, and assists the First Vice-President in financial matters.

There is now a Freight Traffic Manager, reporting to the Third Vice-President. Mr. F. Wolcott Jackson, formerly General Superintendent of the United Railroads of New Jersey Division, is now Resident Manager at Jersey City, an office which was created especially for the purpose of retaining the services of Mr. Jackson in an advisory capacity.

The Delaware Extension and Kensington Division is now called the Philadelphia Terminal Division. The Superintendent of this Division has assumed the duties formerly performed by the General Agent at Philadelphia, this office having been abolished when Mr. Latta resigned last year.

The Pittsburgh, Bessemer & Lake Erie.

Mr. J. T. Odell, Vice-President of the Pittsburgh, Bessemer & Lake Erie, gives, in the New York Evening Post of April 21, some interesting facts concerning the traffic of his road. This line, of which the chief business is to carry iron ore from Conneaut, on Lake Erie, to Pittsburgh, has now been in operation about two years, and Mr. Odell is able to show the economy in the cost of transportation which has been effected by the use of large engines and cars. The principal facts concerning this road have already been noted in the Railroad Gazette, particularly in an article which was published on April 15, 1898, but it will be of interest to recall the main points.

The main line is 153 miles long. The maximum ascending grade going toward Pittsburgh is 31 ft. to the mile. There are five of these grades, aggregating about 30 per cent. of the total distance. On the steepest grades helping engines are used on the freight trains, so that the trainload is what it would be on an average grade of 18 ft. to the mile for the whole distance. The standard locomotive has cylinders 22 in. x 28 in. and the weight on the driving wheels is 85 tons. The track is laid with rails weighing 100 lbs. a yard and the bridges will carry 6,600 lbs. per lineal foot. The ore is carried almost entirely in steel cars of 50 tons capacity, the cars weighing 17 tons. The average paying load of all freight trains, including three branches, was, for the calendar year 1899, 777 tons; and this in spite of the fact that but a small proportion of the cars are loaded on the northward trip. The maximum trainload for the year was 1,580 (net) tons. With rates made on a basis of 3.5 mills per (gross) ton per mile, the earnings per train-mile amount to $5.13. An interesting comparison between a line like this and one which is more nearly level is suggested in Mr. Odell's statement that the expenses of the helping engines during the year 1899 added 2.9 cents to the cost of moving each ton of ore that was carried over the road during the year.

Remarkable economy has been accomplished in transferring ore and coal at Conneaut. Nine ships can be docked at once, and 25,000 tons of freight can be handled in 10 hours. A 6,000-ton ship is unloaded and cleared in 14 hours, and a train of 35 cars is loaded with ore, by steam shovel, in two hours. A 40-ton load of coal is tipped out of a car and into a vessel, and partly trimmed, in 36 seconds. Most of the switching at Conneaut is done by means of a cable running between the rails at four miles an hour. The Carnegie Steel Company has secured a rate of 80 cents a ton on its ore from Duluth to Conneaut this year. This is a third less than the probable prevailing rate this season. By next year the company will have its own fleet enlarged from three to 15 vessels and it will probably be able to carry all of its own ore, 4½ millions tons yearly, at a cost of not over 50 cents a ton.

Mr. Odell says that some locomotives now building for his road will have cylinders 23 in. x 32 in., and will weigh 217,000 lbs. on the drivers.

Train Accidents in the United States in March.

COLLISIONS.

Rear.

5th, 6 a. m., on Illinois Central, near Broadview, Ill., a freight train ascending a grade broke in two and the rear portion ran back into the head of a following freight, making a bad wreck. Twenty men, mostly drovers riding in a passenger car at the rear of the first train, were injured, two of them fatally. The wreck took fire and was partially burned up.

6th, on New York Central & Hudson River, near West Albany, N. Y., a freight train ran into the rear of a preceding freight. A brakeman was killed.

6th, on Nashville, Chattanooga & St. Louis, near Cowan, Tenn., a freight train ran into the rear of a preceding freight, derailing a caboose and one car. One trainman was injured.

8th, 5.30 p. m., on Delaware, Lackawanna & Western, near Newark, N. J., a passenger train which had been delayed by an accident to the air brake apparatus was run into at the rear by a following train consisting of an engine and one baggage car, and the rear passenger car was crushed for about 10 ft. of its length. Three passengers were injured. The collision occurred on a straight line and the conductor of the passenger train succeeded in warning the passengers in the rear car in season to enable them to run to the forward end and thus escape injury. The flagman had been back and placed torpedoes on the rail; and the colliding engine not only disregarded the torpedo signal but also ran past an automatic block signal which stood against it.

11th, on Wabash road, near Decatur, Ill., a freight train ran into the rear of a preceding freight, ditching eight cars. A man riding on the train was killed and a brakeman was injured.

15th, 4 a. m., on Great Northern, near Gold Bar, Wash., a freight train standing at a water tank was run into at the rear by a following freight; and the fireman, who was under the engine, was killed. One passenger car, a caboose and two cars of freight were wrecked and the wreck was burned up, a fire having started in a car of oil.

16th, 1 a. m., on Alabama Great Southern, at Irondale, Ala., rear collision of freight trains; engineman injured.

20th, on Texas & Pacific, near Robeline, La., a freight train descending a grade broke apart in two places and the detached portions subsequently collided, wrecking several cars. The wreck took fire and was burned up. The conductor was injured.

24th, on San Antonio & Aransas Pass, at Chilton, Tex., a local freight train standing at the station was run into at the rear by a following freight, wrecking the caboose; fireman injured.

And 21 others on 19 roads, involving 2 passenger and 32 freight and other trains.

Butting.

1st, 5 a. m., on Illinois Central, at Pope, Miss., butting collision between a northbound passenger train and a southbound freight. Both engines and a mail car fell down a bank. One engineman and one fireman were injured.

3d, on New York Central & Hudson River, near Dresden, N. Y., butting collision between a southbound passenger train and a northbound freight, wrecking both engines. An engineman riding in a car of the passenger train was fatally injured. It is said that the collision was due to a mistake in giving telegraphic orders.

4th, 1 a. m., on Chicago, Milwaukee & St. Paul, at Bagley, Ia., butting collision between eastbound passenger train No. 4 and a west-bound freight train, badly damaging both engines and several cars; one engineman and one fireman injured.

12th, on Norfolk & Western, at Bonsack, Va., an eastbound freight train ran over a misplaced switch and into the head of a westbound freight train, badly damaging both engines. One trainman was injured.

15th, on Kansas City, Memphis & Birmingham, at Blue Springs, Miss., butting collision of freight trains due, it is said, to a mistake in telegraphic orders. Both engines and seven cars were badly damaged. One fireman was killed and three other trainmen were injured.

20th, on Chattanooga Southern, near Blue Bond, Ala., butting collision between a freight train and an empty engine, badly damaging both engines; two trainmen injured.

29th, on Plant System, near Ocala, Fla., butting collision between a passenger train and a wrecking train, badly damaging both engines. The engineman and one passenger were injured, the latter fatally.

And 10 others on 9 roads, involving 20 freight trains.

Crossing and Miscellaneous.

1st, on Western Maryland, at Hagerstown, Md., collision of freight trains; one trainman injured.

5th, on Chicago & Eastern Illinois, at Brazil, Ind., a train carrying 400 workmen from the mines was run into by a local freight and one caboose and two passenger cars were wrecked. Two of the passengers were killed and 40 or more were injured, several probably fatally.

10th, on Central of New Jersey, at Elizabeth, N. J., a switching freight train collided with some cars standing on a side track and the conductor was fatally injured.

11th, at Blasdell, N. Y., a freight train of the Erie ran into a freight of the New York, Chicago & St. Louis, at the crossing of the two roads, and the caboose of the latter train was wrecked. Two trainmen were injured.

12th, on Erie road, at Goshen, N. Y., a locomotive crossing the main line at a crossover track was run into by an eastbound through freight train which approached the station at uncontrollable speed, and both engines were badly damaged. It is said that a signal which should have stopped the through freight remained in the clear position when the signalman pulled the lever to place it in the stop position, the wire having broken and the counterweight being too light to restore the signal arm to the normal position.

15th, on Baltimore & Ohio, at Lemont, Pa., collision of freight trains, wrecking one engine and 12 cars. An engineman was killed.

15th, on Southern Railway, at Parkland, Ky., collision of freight trains; one trainman injured.

20th, on Chicago, Milwaukee & St. Paul, at Hull, Ia., a freight train switching in the yard was run into by westbound passenger train No. 73, damaging the engines and several freight cars. The freight conductor was killed and a brakeman was injured.

23d, on Missouri, Kansas & Texas, at Ft. Worth, Tex., a passenger train ran over a misplaced switch and into some boarding cars standing on the side track. Three employes were injured, one of them fatally.

25th, on Allegheny Valley road, at Foxburg, Pa., collision of freight trains, ditching 12 cars and badly damaging an engine; conductor and engineman injured.

28th, 3 a. m., at Ft. Worth, Tex., a freight train of the Gulf, Colorado & Santa Fe, drawn by two engines, ran into a freight of the Houston & Texas Central, at the crossing of the two roads, wrecking two engines and four cars. One brakeman was injured.

28th, on Southern Railway, at Greenville, S. C., collision between a freight train and a switching engine; two trainmen injured.

28th, on Louisville & Nashville, at Cave City, Ky., a freight train entering a side track was run into by a passenger train; five passengers injured.

28th, 8 p. m., at Whiting, Ind., a passenger train of the Baltimore & Ohio ran into a freight of the Chicago Junction road, at the crossing of the two roads, and the passenger engine was ditched. The engineman was killed and the fireman injured.

And 21 others on 15 roads, involving 3 passenger and 36 freight and other trains.

DERAILMENTS.

Defects of Roadway.

5th, on East Broad Top Railroad, at Cook's, Pa., a passenger train was derailed by a broken rail and the cars fell down a bank. The conductor was killed and three passengers were injured.

7th, 1 a. m., on Pittsburgh, Ft. Wayne & Chicago, at Robinson Street, Allegheny City, Pa., the locomotive of a westbound freight train, moving at low speed, broke through the double track plate girder bridge spanning the street, and fell to the ground below. The fireman and one brakeman were killed and the conductor was seriously scalded. The engine was No. 322 of the Pennsylvania Railroad, a large new one. The bridge was 68 ft. long.

8th, 1 a. m., on Burlington & Missouri River, near White Cloud, Kan., a freight train ran into Cedar Creek, the bridge over that stream having been washed away, and the engine sank out of sight. The engineman, fireman and one brakemen were injured and nearly drowned. The fireman died from his injuries.

19th, 1 a. m., on Northern Central, at Stanley, N. Y., a freight train was derailed by a broken rail and 10 cars were ditched. A brakeman was injured.

27th, 11 p. m., on Philadelphia & Reading, near Pottsville, Pa., a freight train broke through a bridge and 15 cars were wrecked.

29th, 1 a. m., on St. Louis, Iron Mountain & Southern, near Traskwood, Ark., a freight train broke through a trestle bridge, which had been weakened by fire, and the engine was badly damaged. The engineman and fireman were killed.

And 9 others on 8 roads, involving 2 passenger and 7 freight and other trains.

Defects of Equipment.

17th, on Lehigh Valley road, near Flagtown, N. J., a car in a freight train was derailed, by the failure of a heated journal, and fell down a bank. The car was the third from the engine and was heavily loaded. The cars behind the one that was derailed continued on their way, and by the time the conductor had stopped the train, which he did when he felt the speed too suddenly checked, the two parts of the train had been automatically coupled together, and it was some time before he discovered that he had lost a car.

29th, on Delaware & Hudson, near Harpersville, N. Y., a freight train was derailed by a broken wheel and five loaded cars were wrecked. The brakeman was killed.

And 21 others on 16 roads, involving 21 freight trains.

Negligence in Operating.

21st, 4 a. m., on Pennsylvania road, at Altoona, Pa., a short distance east of the station a westbound express train running about 40 miles an hour was derailed by running too fast through a crossover track and the engine was overturned. The first two or three cars were wrecked. The momentum of the train pushed the engine some distance after it fell over and a rail penetrated the front end of the boiler. The engineman was killed and the fireman and a brakeman standing on a freight car nearby were injured. The switch, suitably signaled and interlocked, had by mistake been set for the side track, one which is never used at night; and it seems that the engineman failed to observe that it was the side track signal which was cleared for him, instead of that for the main line.

31st, on Baltimore & Ohio, near Piedmont, W. Va., a freight train was derailed at a point where a rail had been taken out for repairs, and the engine and nine cars were ditched. The engineman jumped off and was injured.

And 7 others on 7 roads, involving 1 passenger train and 6 freight trains.

Unforeseen Obstructions.

1st, 7 p. m., on New York, New Haven & Hartford, near Farmington, Conn., a passenger train was derailed at a washout, said to have been caused by a choked culvert, and the engine and three cars fell into the flood. The engineman, baggageman and one passenger were killed and three trainmen and 12 passengers were injured.

1st, 8 p. m., on New York, New Haven & Hartford, at East Longmeadow, Mass., a passenger train was derailed at a washout and the engineman was injured.

1st, 11 p. m., on Fitchburg road, near Shirley, Mass., a freight train was derailed by a washout and five trainmen were injured, two of them probably fatally.

9th, on Norfolk & Western, near Pulaski, Va., a freight train drawn by two engines was derailed by a landslide and both engines and several cars were wrecked. One fireman was injured.

22d, 8 p. m., on Baltimore & Ohio, near Shaner, Pa., a freight train was derailed by a landslide and the fireman was killed.

24th, on Kanawha & Michigan, near Charleston, W. Va., a freight train was derailed by running over a hand car and three cars were wrecked. Three employes were injured.

25th, on Southern Railway, at Demopolis, Ala., a freight train was derailed by running over a mule and the engine fell down a bank. The fireman jumped off and was killed.

26th, on St. Louis Southwestern, near Camden, Ark., a freight train was derailed by an accidental obstruction and the engine and 15 cars were ditched. Two tramps were injured.

And 7 others on 6 roads, involving 1 passenger train and 6 freight and other trains.

Unexplained.

2nd, on Grand Rapids & Indiana, near Hobart, Mich, the foremost of two engines drawing a freight train was detached just after passing over a summit and started forward to get out of the way of the train; but before running far it was derailed and the other engine, with its cars, ran into the derailed engine. Eight cars were wrecked and a car attached to the foremost engine was destroyed by fire.

8th, 10 p. m., on Southern Railway, at Mascot, Tenn., a freight train was derailed at a switch and two engines and 13 cars were ditched. One fireman was injured.

14th, on Southern Pacific, near Colfax, Cal., a freight train was derailed and five cars were ditched. A man stealing a ride was killed and another was injured.

18th, on Plant System, near Ozark, Ala., a passenger train, running at full speed, was derailed; and the engine, tender, two day cars and two sleepers fell down a bank. One pasenger and the conductor were fatally injured. Eight passengers and four other trainmen were less severely hurt.

21st, on Mobile & Ohio, near Lauderdale, Miss., a freight train was derailed and a brakeman was fatally injured.

26th, on Atlanta & West Point, near Opelika, Ala., the westbound fast mail train was derailed and the first four cars were ditched. The express messenger was killed and four employes and 10 passengers were injured.

30th, on Southern Pacific, at Tracy, Cal., a switching engine was derailed and two trainmen were injured.

And 47 others on 29 roads, involving 8 passenger and 39 freight and other trains.

OTHER ACCIDENTS.

6th, on Washington County road, near Eastport Junction, Me., a private car occupied by a theatrical company, which was next to the rear car of a passenger train, took fire while the train was running at full speed and was mostly destroyed. The occupants of the car had difficulty in stopping the train in season to escape the flames. The fire was started by the explosion of an oil stove in the kitchen.

10th, on Chicago & Alton, near Petersburg, Ill., an oil tank car in a freight train exploded while crossing the Sangamon River and destroyed a portion of the bridge. Five cars fell into the river.

18th, 3 a. m., on Manhattan Elevated, at Rector Street, New York City, the engine and two passenger cars of a northbound passenger train were badly damaged by a coal chute which had become loose and fallen from its position. The engineman was struck and disabled before he had time to shut off steam, so that the train ran several hundred feet before it was stopped. The engineman, fireman and seven passengers were injured.

28th, on Norfolk & Western, near Breeden, W. Va., the locomotive of a freight train was wrecked by the explosion of its boiler and 12 cars were derailed and badly damaged. The engineman and fireman were killed.

And 2 others on 2 roads, involving 1 passenger train and 1 freight.

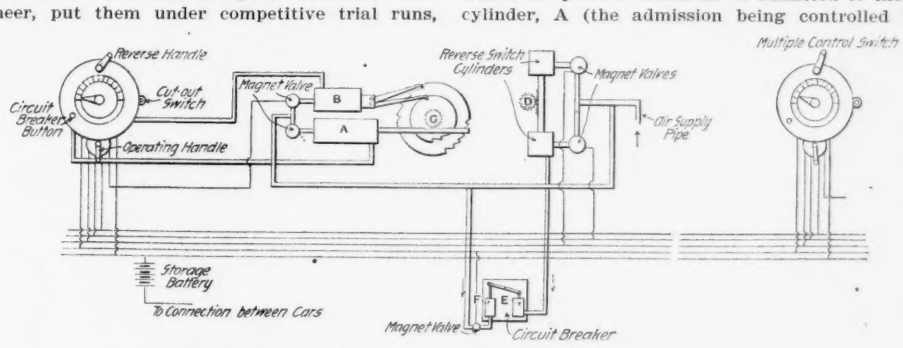
A summary will be found on another page.

Electrical Tests of the Boston Elevated Railroad.

For several weeks preparations have been in progress in the equipment of electric cars for competitive tests under the direction of the Boston Elevated Railroad Company. A number of trial runs have been made during the past two weeks and records taken showing the performance of each train under certain prescribed conditions. Primarily, the tests have been made to determine what system of controlling the motors from one point was best adapted to the trains of the Boston Elevated. These trains were made up of four cars each, part of which were passenger cars, equipped so as to conform as nearly as possible to regular service cars on the elevated railroad. Each train was equipped with different methods of unit control, one of them with the Sprague apparatus, a second the Westinghouse, and a third the General Electric. These are named in the order of their introduction for elevated railroad service.

The Sprague system has been in use on the trains of the South Side Elevated and elsewhere for a number of years. The Westinghouse system is recently perfected, but trains have been running at Pittsburgh, on the Brooklyn Elevated, and perhaps elsewhere for some months, so that the success of this method of multiple control was practically assured before the cars were equipped for the trial. The General Electric system has just been completed, although the work has been in progress for some two years. The details of the apparatus used are not generally known.

The Boston Elevated Railroad took this opportunity to try other apparatus, as car heaters, brakes, etc., and each train was equipped with apparatus of different makes: Thus, the Westinghouse train had the Westinghouse automatic air brake, the Sprague train was equipped with the Christensen brake and the General Electric train with the New York Air Brake Company's apparatus. The trains were turned over to the officers of the Boston Elevated, who, under the direction of Mr. George A. Kimball, Chief Engineer, put them under competitive trial runs, when careful records were taken of accelerations, speed, time required to stop the train and similar data were obtained. It is probable that the cost of the different apparatus will eventually control the adoption of one of the three systems.



The Westinghouse Electro-Pneumatic System of Motor Control.

On Wednesday morning of last week, from 1 to 5 a. m., a number of engineers rode on the trains in the subway and had an opportunity to inspect the equipments and to judge of the relative merits of each train. The trains were at all times under perfect control of the motorman and the starting and stopping were as easy and smooth as could be desired. Some acceleration tests were made and it was estimated that speeds as high as 40 miles an hour were reached. The subway was certainly not laid out for heavy trains at high speeds. The large number of reverse curves with little or no elevation of the outer rails on many of the curves, and the heavy grades make the conditions very severe. Each train was made up of dummy cars and standard Boston Elevated Railroad cars, the latter either supplied by the company or designed especially by the electrical companies to answer the needs of the Boston Elevated. All the trains weighed 60,000 lbs. The Westinghouse train was made up of one platform dummy car and two elevated railroad cars built by the Westinghouse Company for their own use and one car of the Boston Elevated, the apparatus in each passenger car arranged as it would be in regular service. All of the cars in the tests had Baldwin-Westinghouse trucks: The details of the Sprague multiple unit control have been described many times and the General Electric system we hope to refer to later.

The Westinghouse Electro-Pneumatic System of Multiple Unit Control.

In order to describe briefly and clearly the Westinghouse system we have prepared an outline diagram, which is intended simply to show the principle on which the apparatus works. In this system, there are four main parts, namely, the controlling apparatus proper, on the standard controller, the circuit breaker, the multiple control switch, including the reverse and other switches. The multiple control switch contains handles for controlling the movements of the train. This switch can be put in any convenient place in the motorman's cab. The method of working the several switches will be described later.

The apparatus proper is mounted on a standard controller (see illustrations in Railroad Gazette, Oct. 13, 1899) and the devices for operating the controller, circuit breaker and reverse switch do the work which the motorman does when the ordinary method of hand control is used. In the Westinghouse system, two ratchet wheels and a pinion, as shown in the illustration, are put on the extreme end of the shaft of the main operating drum. The shorter of the two cylinders shown contains the piston, B, for working the pawls which engage the ratchet wheels. The piston rod of the longer cylinder, A, has a rack which meshes with the pinion. Both of these are arranged so as to produce opposite directions of rotation of the controller drum. The movements of these pistons are controlled by ironclad magnets which work air valves connected with the main air supply pipe on the train. These valves, which admit air to the cylinders, are provided with a spring for keeping them normally in the closed position. The magnets, when excited by means of a movement of the operating handle on the multiple control switch, require but $_{10}$ of an ampere at six or eight volts to open them sufficiently to admit the necessary air. A battery of eight to ten cells is required for a train of four cars; each motor car has a battery.

A single movement of the operating handle of the multiple control switch causes a single stroke of the ratchet piston and turns the controller "on" one point. Hence this piston must make as many strokes in turning the controller "full on" as there are operating points or notches. Should it be found that the train did not start as smoothly as desired, more notches could be cut on the ratchet wheels. To prevent the inertia of the controller drum from carrying it further than intended, the ratchet wheel has on the under side a series of projections. A stop attached to the frame successively engages the several projections by the air pressure in the cylinder which works the pawls. When air is admitted to the long cylinder, A (the admission being controlled by a movement of the operating handle), the piston is forced to the end of its stroke and the controller is thrown to its "off" position.

The general principle on which the reverse switch works is about the same as for the controller, a general notion of which may be obtained from the diagram, although no attempt has been made to make the parts of the correct dimensions or to put them relatively where they would be on a regular equipment. The shaft of the reverse switch, D, which is on the controller box, is extended above the top and carries a pinion. The rack which engages the pinion is formed on a piston rod having at each end a small piston which works in a corresponding cylinder. On one of these cylinders are mounted two magnets and the necessary valves for obtaining the admission of air through the ports to either of the two cylinders. When air is admitted to one cylinder, the reverse switch is set in a position for giving a forward movement to the car and when admitted into the other cylinder, will set the reverse switch for a backward movement. The admission of air into these cylinders is controlled by a movement of the reverse lever on the control switch.

The circuit breaker has two cylinders with pistons and rods arranged to act on a lever for opening and closing the circuit breaker. These are of different sizes, the larger of which, F, receives air from the reverse switch cylinders on the controller. The smaller of the two, E, is controlled by the circuit breaker button and the air supply for this is controlled by a magnet similar to those used on the controller.

The operating handle of the multiple control switch is normally vertical. When turned to the right the circuit to the magnet of the operating cylinder is closed with the result that the controller is turned on one notch. When turned to the left from its vertical position the controller is released and the circuit to the magnet of the release cylinder, A, is closed. The reverse switch is turned to the right when it is desired to make the car go forward. This closes the battery circuit through the magnet which works the valve, admitting air to one of the reversing cylinders on the controller. When the handle is turned to the left an opposite movement takes place

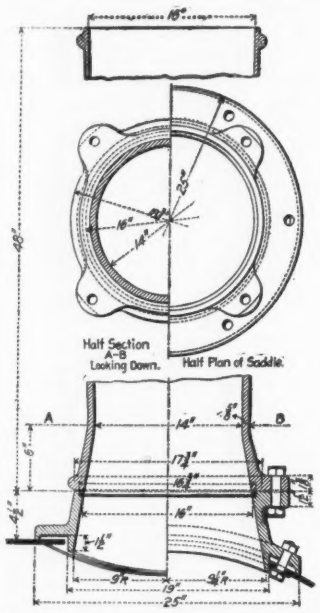


Fig. 1.—14-in. Smoke Stack and Base.

and air is admitted to the other reversing cylinder on the controller and the car moves backward.

The handle on the sketch marked "cutout switch" is used to cut out of service a part of the controllers on the train. When in the extreme upward position the motor car on which the box is mounted is in service while the others are out of service. When the handle is thrown down the motor car on which the box is mounted is out of service and the other motor cars do the required work. When in the middle position all the motor cars of the trains are in service.

Another feature of this system is worthy of note. When the air brake is applied the controller will be released by the air pressure from the brake cylinder if by any means this has not been done by the operator. It is not necessary, therefore, to first release the controller before applying the brakes, but a single movement of the brake valve opens the motor circuit by causing the controller drum to return to the off position and at the same time applies the brakes.

The principal advantages claimed for the Westinghouse system may be summarized as follows: (1) A standard controller and standard types of cylinders, valves and magnets made for many years are used. (2) The Westinghouse system uses low voltage current independent of the main circuit in working the controlling apparatus. This prevents fluctuations of voltage in the current. Moreover, no fuses are required in the control circuits and there is no chance of grounds in short circuits occurring at connections between the cars. (3) The motorman can at will instantly open all circuit breakers or cutouts on the train. (4) The controllers are automatically turned off by the application of the automatic air brake and the controllers and circuit breakers are opened by the breaking in-two of the train. (5) The controllers can be worked by hand in case of an emergency or for convenience in inspection; besides, the controllers on one or more cars can be cut out by the motorman at the multiple control switch without going to several cars in the train. (6) All automatic movements of the controllers are made simultaneously.

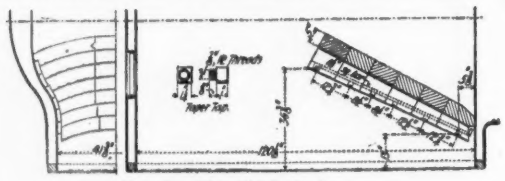


Fig. 5.—Fire Brick Arches.

Burning Bituminous Coal Without Smoke on the Southern Pacific System.

There is hardly any more difficult problem in locomotive engineering than the old one of economical and complete combustion of bituminous coal without smoke and the difficulty lies in applying theory to practice. The Southern Pacific is now burning bituminous coal with practically no smoke and this is accomplished through skilful design of the parts of the locomotives that affect combustion together with careful training of the enginemen. The methods and results obtained are in the following notes furnished to us by Mr. J. Snowden Bell, of Pittsburgh, Pa., who recently rode on a Southern Pacific train and engine. It is quite unnecessary to add that Mr. Bell is an expert in all matter pertaining to locomotive design and construction and particularly in the design of locomotive fireboxes and draft appliances. These observations can best be given in his own words.

"I left Sacramento at 12.50 p. m. February 19, on a train of six passenger cars, one of which was a sleeper, and two 8-wheeled cabooses hauled by a Schenectady ten-wheel engine of the 1800 class having 20 x 26-in. cylinders. I rode some distance east from Sacramento in the cupola of one of the cabooses, and was therefore enabled to fully observe the escape from the stack. For most of the time, it might have been taken for that of a hard coal burner; there was absolutely no black or heavy smoke, and only a small amount of light smoke when the engine was shut off or occasionally when firing.

"When riding on the engine up a 108-ft. grade, hauling six cars, I very carefully observed the manner of firing, condition of fire, and character and volume of smoke, and the perfection attained in these particulars was a revelation to me. The fire was kept clear and bright, without either being heavy or having holes in it, and steam was maintained at 180 lbs. during all the time that I was on the engine, and the fire door was never closed. I never saw a soft coal burning engine, either on a level or on a grade, which could be compared as to freedom from smoke with the engine on this run. There was comparatively little smoke at any time on the grade, and even when starting the train on such a hard pull, there was less smoke than I have usually seen in the east on a level.

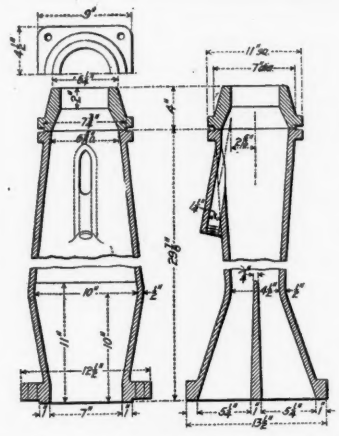


Fig. 3.—Exhaust Pipe and Nozzle.

"The method of light and frequent firing which was practiced is clearly the correct and intelligent one, and, in my opinion, involves less fatigue on the fireman than the ordinary heavy firing. The young man who fired this engine did so with ease, and I am informed that they have boys of 18 firing their heavy engines on the mountains. Without any inspection of records, or facilities of comparison, it is clear to me that they are effecting a substantial economy in fuel, and they are certainly greatly contributing to the comfort of passengers on their lines.

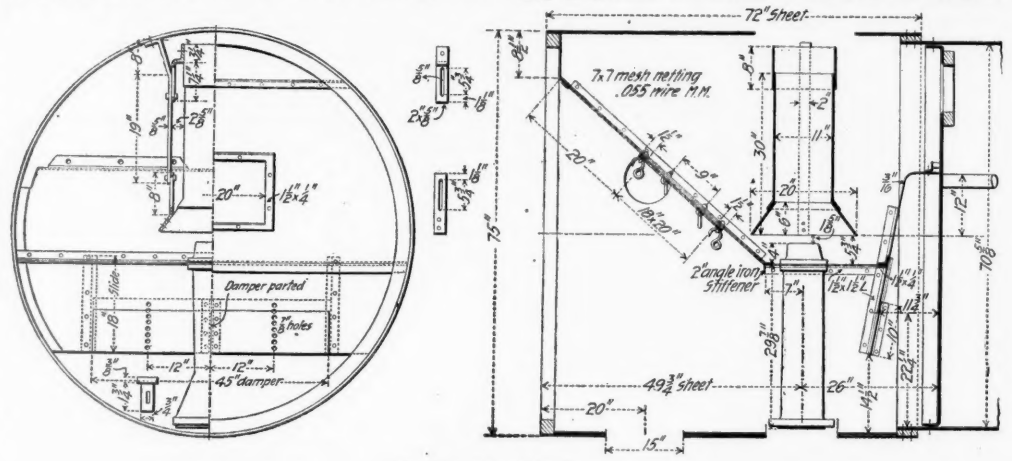


Fig. 2.—Extension Front,

"The small fire door opening was a novelty to me, but is obviously an excellent feature, and this, with the thorough and uniform distribution of air and support of fuel by Mr. Heintselman's latest design of grate, an effective ashpan, and proper front end arrangements, are clearly the factors to which, with good firing, the results are due. In view of the importance of the subject, and of my interest in it, I greatly regretted that I was limited to the brief observation which I have generally stated above. In my judgment the Southern Pacific methods and appliances can be studied with advantage by motive power men generally who are using bituminous coal fuel, and it will surprise me very much if they are not considerably followed on other systems.

"The kind of coal used on this engine is known as Castle Gate, and is mined in Utah and its analysis is as follows:

	Per Cent.
Moisture	2.15
Volatile combustible	39.10
Fixed carbon	50.75
Ash	7.40
Sulphur	.60

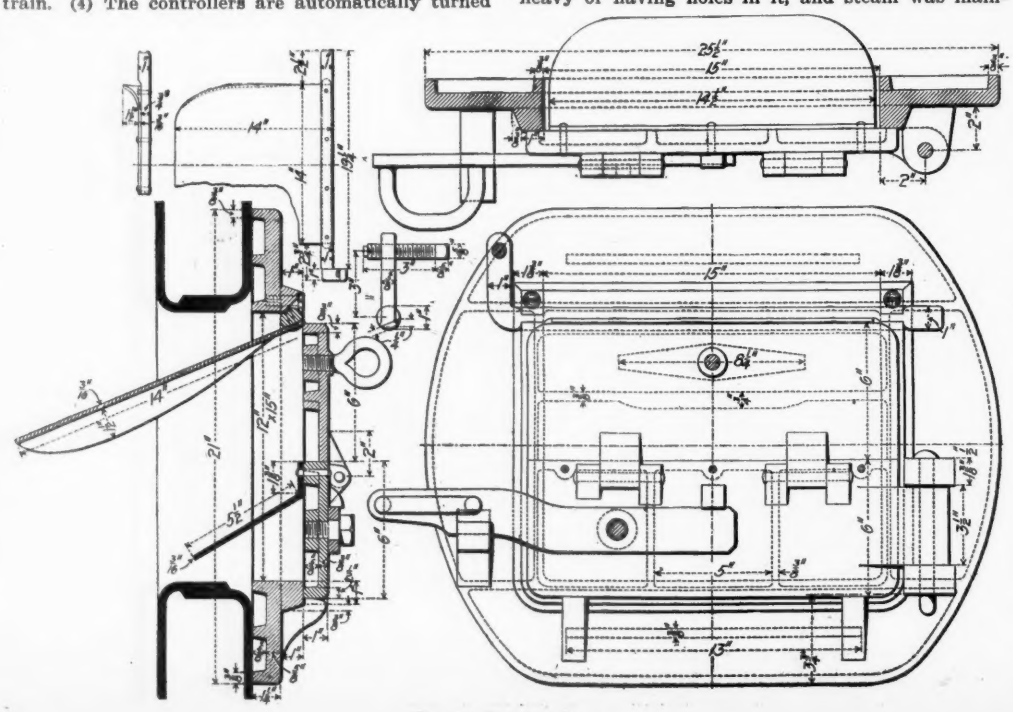


Fig. 4.—Furnace Door.

Through the courtesy of Mr. H. J. Small, Superintendent of Motive Power of the Southern Pacific, we are able to show the detail drawings of all the mechanical features which contribute to this result, as applied especially to twelve-wheel, 22 x 26-in. locomotives. The drawings of the stack, fire door and shovel, however, are general and apply directly to more than one class of engines.

The standard cast iron stack and saddle, Fig. 1, are used on several classes of engines and the results obtained in service are entirely satisfactory. Although incorrect in theory, it has been fully demonstrated that it is really unnecessary to incur the expense of maintaining a special pattern of stack for each class of engines, and as a matter of fact the Southern Pacific has only three patterns of

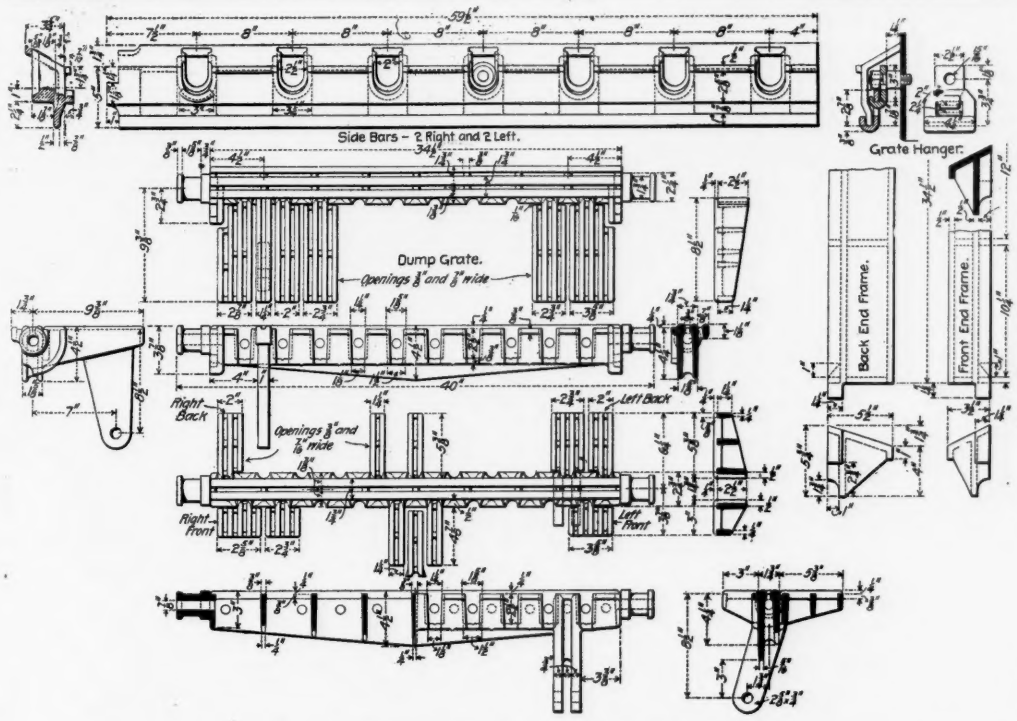


Fig. 6.—Improved Finger Grate and Grate Bearings.

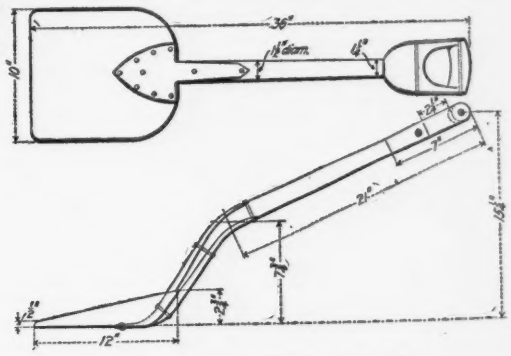


Fig. 9.—Fireman's Standard Shovel.

stacks for the entire system and these have been used since 1890. It will be noted that the stack shown is practically the same as that recommended by the Master Mechanics' Association in 1896.

Fig. 2, showing the interior arrangement of front ends, is also practically the same as recommended by the Master Mechanics' Association in 1896, and left open continually while the engine is working and through this opening, which is 6 x 15 in. for the large engines, the fireman charges coal into the firebox. It will be noted that the deflector, projecting through the door and opening into the firebox, is adjustable to any angle desired; it so guides the air admitted through the "trap" as to best aid

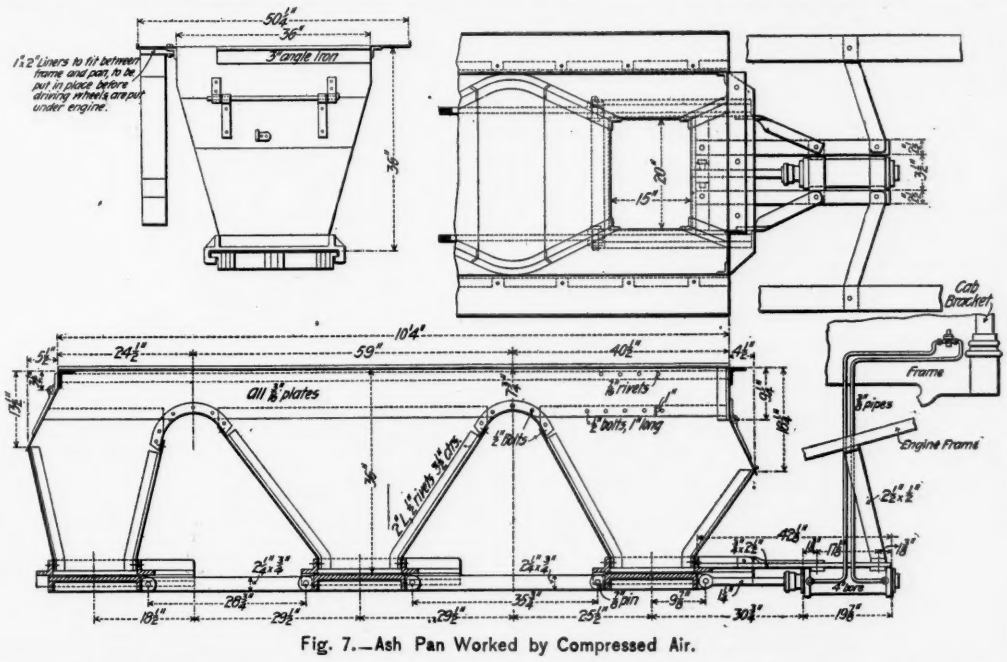


Fig. 7.—Ash Pan Worked by Compressed Air.

is giving satisfactory results. It has been adopted as standard by the Southern Pacific, notwithstanding that it is necessary to use 7 x 7 mesh netting, and during the dry summer months 8 x 8 mesh netting in engines running through the valley district. The exhaust pipe and nozzle for the twelve-wheeler class are given in Fig. 3.

The furnace door, Fig. 4, is used on all coal burning engines, the door proper being in two sections. The upper section, commonly called the "trap," is combustion and its proper position is determined very readily by the enginemen. It also serves as a check on firing with large lumps of coal, or large amounts of coal regardless of size.

Fig. 5 shows clearly the arrangement of the brick arch which is of the ordinary type and needs no special mention, excepting that it is considered an important factor and helps to produce perfect combustion and economy in fuel consumption.

The improved finger grates and bearings shown in detail in Fig. 6 are novel, as is also the manner of hanging the grates from the firebox sheets. It will be seen that the hanging of the side bars is so arranged as to compensate for the expansion and contraction of the grate bars, and by means of the collar at the end of each trunnion bearing the grates are held central at all times, keeping the air spaces equally divided between the fingers. The air spaces through the body of the grate bar and fingers serve to distribute the air to the fire more evenly and at the same time the thickness of the metal in the body and fingers is reduced to a minimum. The fingers being detachable, they can readily be removed and replaced when change of air openings or spaces between fingers is desired to suit different kinds of coal; or, in case any number of fingers becomes damaged in any way they can be replaced, thereby saving the remainder of the grate. The fingers are applied to the grate bars in the rough, or just as received from the foundry.

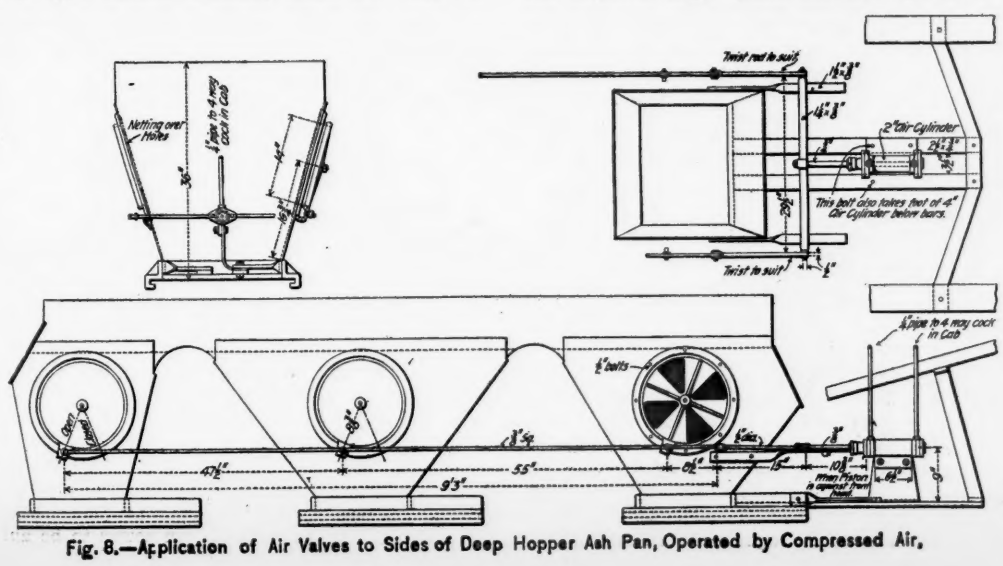


Fig. 8.—Application of Air Valves to Sides of Deep Hopper Ash Pan, Operated by Compressed Air.

The general arrangement of the self-dumping ashpan (adapted to twelve-wheelers) operated by compressed air is shown in Fig. 7 and the application of air valves to the sides of the ashpan is shown in Fig. 8; these side valves are also worked by compressed air. This style of ashpan is considered an important improvement and has resulted in a saving of fuel, and a saving in labor and delays to trains on account of cleaning. The side dampers distribute the draft through the grates evenly, whereas, in former arrangements with only end dampers the draft was excessive through the center of the grate and insufficient at the sides and ends. Clinkers no longer form on the sides of the firebox and the fireman is always free to shake the grates, knowing that the ashpan will not become filled up, as the new pans can be dumped in a few seconds by a single movement of a valve. Therefore a light fire can always be carried and there are no delays for cleaning; with former styles of ashpans where the fireman removed the ashes with a hoe, trains were sometimes delayed on this account as long as thirty minutes. The new ashpans are so arranged that there is no chance of sparks dropping, and when drifting down grades all the dampers, if required, can be closed with one movement of the air valve, or the openings can be partially closed to suit the conditions.

The size of the fireman's shovel is given in Fig. 9 and although it is remarkably small, some of the men make it still smaller by trimming it to suit their individual ideas.

One thing more may be mentioned as in a way contributing to the success of the Southern Pacific in burning bituminous coal, and that is a daily report made by the Traveling Fireman. This is of value in keeping the head of the department posted as to whether the work of firing is being properly attended to. The blank used for this report gives the number of the train, date, names of the enginemen and between what stations the report covers. The questions are well designed to bring out any failures of the men or machinery and are as follows:

Kind of coal, and was it broken to suitable size?

Was draft on fire properly equalized; if not, what suggestions have you to offer?

Was there any trouble due to clinkers or dirty fire? If so, state cause.

How many times was it necessary to clean fire over the division; and time consumed in each case?

If any trouble was experienced for want of steam, what, in your opinion, was the cause of it?

What was the condition of the fire and ashpan on arrival at terminal?

Was fireman disposed to comply with instructions and practice economy, and prevent black smoke?

Was the general condition of the engine such that would indicate any neglect whatever on the part of the fireman?

Was engine slipped unnecessarily?

Were injectors handled so as to obtain the best results in fuel economy?

Was engine in good serviceable condition? If not state defects.

The Traveling Fireman is also expected to note on the report or write a letter regarding any other things that may be noticed while traveling or at terminals, that in any way would better the engine service or effect a saving.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

On the Chicago & Northwestern all fixed signals governing movements over diverging routes (as well as all governing movements on or from side tracks, or in the reverse direction on main lines) are placed low; that is, either on a dwarf post or on the high post about 4 ft. or 5 ft. from the bottom. Thus an engineman running fast has only a single light to look for, where, under the usual practice, he would find two, one above the other, and be obliged to decide quickly which one of the two showed "all clear." This plan has been followed in all new work since 1896, and the officers of the road like it. Where a low signal is on the same post with or alongside of, a high signal, the lamp is covered with a shield and completely obscured when the signal indicates "stop." This substitution of a low for a high signal is brought to mind at this time by a serious train accident, at Altoona, Pa., which appears in the March record. A fast night passenger train was derailed, with loss of life and the destruction of two or three cars, in consequence, apparently, of a mistake in observing signals, on the part of both the engineman and the fireman. (The firemen are required to observe fixed signals and to speak to the engineman; and in this case the fireman says that he did see the signal and spoke to the engineman.) As the engineman was killed, no satisfactory statement of the facts can be made, from the standpoint of the men on the engine; but the account as given in our record is substantiated, we understand, by the position of the switches, signals and interlocking after the derailment. But without attempting to settle the question whether, in this case, the engineman and fireman both saw the lower light cleared and thought it was the upper one; or both made some other kind of mistake; or one made a mistake and the other neglected to look; it is worth while to note that the C. & N. W. practice has features of merit, and that it deserves consideration on account of its four-years' test on that road, if for no other reason.

In a letter replying to our inquiries concerning the Northwestern's practice Chief Engineer Carter says:

"This arrangement is based upon the principle that high signals are to govern movements on high-speed tracks in the regular direction of traffic, and signals for diverging routes are to be given by low signals, either on the post or by dwarf signals on the ground, the light at night being shielded so that it will not show at any other time than when the signal is cleared for a diverging movement. All of our night signals are based upon red for 'stop,' green for 'clear' and a combination of red and green for 'caution.' Reverse movements on the main running tracks, and movements on sidings, are controlled by dwarf signals, and at night these are indicated by red for 'stop' and green for 'clear.' The leading idea in the system is, that express runners have the least possible time in which to act, in order to carry out the orders given by the signals, and therefore the signal arrangement should be made the very simplest possible for interpretation by them. Diverging movements and reverse movements are always made at comparatively slow speeds, so that there is not the same necessity for instantaneous action that there is on the part of men running the highest speed express trains. The adoption of the above principles very much simplifies signaling at points where it is necessary to place the signals outside of an adjoining track, as it dispenses with the use of the bracket signal at all points, save where the intervening track is a main running track and operated in the same direction as the track signaled, in which event, of course, the intervening track would be signaled as well as the original track. The mental processes of the engine runner are reduced to the very simplest form. He merely considers whether to run, or stop; if stopped, he either gets permission to proceed from his high signal at the proper time, or observes the low signal and takes a diverging route, if that is the movement which he is expected to make. In practice, in making a diverging movement, he would merely get his train under control and would then see the dwarf signal on the right hand side of his track and, accepting it, proceed at a low speed through the route that was set up for him."

In adopting a plan by which high signal posts shall never show more than one light to fast trains at night, the Chicago & Northwestern people no doubt find a renewed satisfaction in their use of green lights for all-clear. If they used white lights they would find that in reducing the number from two (or more) to one, they were increasing the danger of confusing signal lights with lights in houses and in street lamps. On the Pennsylvania Lines West of Pittsburgh, where white is still used for all-clear, a second high light is used on home signals, even where there is no diverging route, so as to aid enginemen in quickly reading the signals. As such a "dummy" light would always show red, it may almost be said to aggravate the trouble which the C. & N. W. has taken measures to avoid. Another interesting feature of the C. & N. W. practice is the recognition (in the low signal) of the principle that the go-ahead signal is more important than the stop signal. This recognition, in this way, cannot be treated as anything great or radical, for the red light at the top of the post answers as a stop signal for the diverging route as well as for the main line; but the shield will be a useful object lesson, nevertheless. A vital principle in fixed signal practice is that an engineman shall never pass a signal post until he sees an all-clear signal for the route over which he is to travel. From this it logically follows that the stop indication is unnecessary, as the absence of any indication means "stop." In the C. & N. W. low signal for diverging routes we see this theory exemplified (though only at night); and it may be that after a while we shall come to abate the awe in which we now hold the red light.

Anyone who wishes to fully understand the latest phases of opinion concerning the proposals to amend the Interstate Commerce law should get the report of the two hearings given by the Cullom (Senate) Committee on April 6 and 13. On these dates Messrs. George R. Blanchard, Aldace F. Walker and Walker D. Hines presented arguments against giving the Commissioners the power to put their rate-changing orders in force pending appeals by the railroads to the courts, and Commissioner Prouty argued in favor of the proposition. It is embodied in the Cullom bill (Senate 1,439) heretofore described in the Railroad Gazette, which enlarges the powers of the Commission in several particulars and orders uniform classification. Representatives of certain trade associations also appeared for the bill, but their argument was less cogent and forcible. One of them, however, got the Government to bear the expense of printing 107 pages of newspaper articles in favor of the Cullom bill. There is little in any of the arguments on either side that is new; but the two pamphlets make a good compendium of the whole controversy. This last statement we must, of course, qualify by telling the reader that the several addresses, papers and cross-examinations make 150 pages, so that the matter is not very easy to read. The Senate Committee should now be pretty well informed as to the real nature of the railroad problem, though whether the members could intelligently impart even a tithe of their information to the whole Senate is a matter of grave doubt. Whether or not the Senate intends to really consider the question at this session is, indeed, uncertain, though the millers and some other organizations which desire the amendment have lately quickened their pace and it is reported that they are working to bring matters to a head. Senator Cullom also is said to be disposed to bring to an end the long and inconclusive work of his committee.

Mr. Blanchard's address was very full and detailed. He takes up each point in the Cullom bill by itself; and in presenting his arguments against it gives examples from his own experience to illustrate and enforce his point. He was cross-examined by Senator Tillman and by other members of the committee, but we cannot see that they weakened his position in any material point. Mr. Blanchard said he appeared at the request of the New York Central, the Pennsylvania and the Baltimore & Ohio roads. After giving his criticisms he told how he would amend the law; but in this matter he was, he said, speaking for himself, not for any particular road or roads. He would enlarge the Commission to seven members and would have hearings held at regular periods in different places, after the manner of the district courts. Complaints received by the Commission should be made public in a monthly bulletin. Where important changes in rates are demanded, he would have a tripartite conference of the Commission, the shippers and the railroads. Mr. Walker's argument was presented in writing, the Committee not having time to hear him. It is a strong and philosophical discussion of state regulation. He would have Congress do little or nothing at present except to (1) repeal the anti-pooling clause, and (2) legalize traffic agreements among railroads. This does not specifically mention the legalization of pooling, though it would appear from the general tone of the argument that that is what is meant; and Mr. Walker says that the present anomalous condition of the law should be changed whether the railroads ask for a change or not. Mr. Walker thinks a uniform National freight classification would be practicable. Mr. Hines' argument covered few points not dealt with by the other two, but he was particularly lucid on cross-examination; and he was complimented by the Chairman as an impartial witness, or "as near that as he could be and be employed on one side"; and yet, as thereader will readily understand from articles of his which have appeared in the Railroad Gazette, he presented a powerful and incisive criticism of the demands of the Commissioners for more authority. All of these three gentlemen criticised the 60-day limit for changing rates, and other impracticable features of the bill.

Mr. Prouty sustained the position of the Interstate Commerce Commission in a masterly manner. He set forth the facts of cases like the Danville complaint (reported in these columns April 13), so as to show in the most striking way the evils of the present situation. He emphasized the omissions of the other speakers and enlarged on the delays of the law. Messrs. Blanchard and Hines maintained the sufficiency of the statutes as they now are, but Mr. Prouty showed how it takes four years to get a rate changed, and how, theoretically at least, we may expect that an obstinate railroad can stave off reductions for 25 years. In controverting Mr. Blanchard's claim that only a railroad man of long experience can deal with freight rates, Mr. Prouty waxed vigorous. He said:

> These gentlemen further say that these questions ought not to be left to the Interstate Commerce Commission, because no commission can ever be secured competent to deal with questions of that kind. Here are five commissioners—and again I say nothing of the present commission—holding office for six years, devoting their entire time to the consideration of these questions, familiar with traffic matters in all parts of the United States, and I am told that that sort of a commission cannot understand and intelligently pass upon these rate questions. And what then? Must the Standard Oil Company increase, the beef trust grow rich, the coal trust wax mightier upon these rate preferences and discriminations because no tribunal can be found outside a railroad employe who can intelligently pass upon that question. What supreme nonsense! Did God Almighty exhaust the rate-making stock when he created George R. Blanchard? Can nobody understand a traffic condition unless he be upon the pay-roll of a railroad company? Who is to-day the arbitrator between the Santa Fe Railroad and its shippers? Aldace F. Walker. Is Aldace F. Walker when hired by the Santa Fe at a salary of $20,000 or $25,000 a year more competent to pass upon questions between that company and the public than when he was a disinterested party hired by the Government of the United States as interstate-commerce commissioner at a salary of $7,500?

The thing now most necessary for the purpose of making the National "railroad problem" clear to Congressmen and the people is a public debate. These hearings before the Senate Committee brought out all of the arguments on both sides, but neither side was questioned by the other, and there was little discussion on common ground. If Mr. Hines and Mr. Prouty could be brought together, before a board of three referees, and each be limited to two or three 20-minute speeches, they could do a great public service. They would clarify the great mass of material on this subject which has been laid before the people during the last two years, but which has not been thoroughly digested. The commissioners claim that the Cullom bill does not grant rate-making powers, while the railroads claim that it does; apaprently the truth that lies between these two extremes has never yet been formulated by any person or body which the public looks upon as thoroughly impartial. The two evils—rates which are public but are too rigid, and rates which are secret, unlawful and not rigid enough—are being constantly confused, and no Congressman seems to be able to

get a clear idea of the situation. The great underlying fact that many so-called transportation evils probably cannot ever be cured by legislation, receives little discussion anywhere. All these problems a hand-to-hand debate would make clear—o much clearer than they are to-day.

Heavy Freight Trains on the Union Pacific.

The Union Pacific has recently been handling some remarkably heavy eastbound trains between Cheyenne, Wyo., and North Platte, Neb., where the grades are descending for practically the entire distance of 225 miles. While these heavy trains have been run in the course of the usual business of the road they are really in the nature of experiments to determine to what point train loads can be increased on this section. Trains of from 90 to 100 loaded cars, of 80,000 lbs. capacity, have so far been run successfully between these points, and a train of 134 loaded cars has been run for a short distance; it is believed that had it not been for a heavy snow storm even that immense train could have been taken through with safety. The facts brought out are important as the heaviest traffic is eastbound, although at present it is insufficient to warrant such long trains as these trials show to be practicable. That is, for some time to come the traffic out of Cheyenne, eastbound, will alone govern the size of trains.

The following table gives data regarding some of the heaviest trains so far run, and it may be noted that they were all solid trains of 80,000 lbs. capacity, steel, coal cars, and the tonnage given is that of the cars and lading only and does not include the weights of the engine, tender and caboose:

Heavy Freight Trains on the Union Pacific.

Date, 1900.	Engine Number.	Cars handled. Loads.	Empties.	Tons.*	Stations. From	To	Mil s.
Mch. 11	1,507	97	2	4,546	Cheyenne..	Pine Bluffs...	42
" 11.	1,711	95	3	4,008	Pine Bluffs .	Sidney..	60
" 12.	1,504	102	11	4,444	Cheyenne.. .	Sidney.	102
" 14.	1,504	109	1	4,911	Cheyenne. ..	Sidney. .	102
" 15.	1,707	93	1	4,071	Sidney	North Platte .	123
April 4.	1,710	57	....	3,340	Sidney	North Platte .	123
" 4.	1,715	61	....	3,536	Sidney	North Platte .	123
" 4.	1,504	134	....	7,765	Archer.....	Egbert..	24

*Tons of 2,000 lbs., exclusive of weight of locomotive, tender and caboose.

The 1,500 class locomotives are new twelve-wheelers with 165,000 lbs. on the drivers, cylinders 21 x 30 in., drivers 57 in. and 200 lbs. working pressure. The engine and tender in working order weigh 305,000 lbs. and further 31,000 lbs. must be added for the caboose to get the gross tonnage. The 1,700 class ten-wheelers are also new and were shown in our issue of August 25 last. The weight on drivers is 134,000 lbs., the cylinders are 20 x 28 in., the drivers 57 in. in diameter, the steam pressure 200 lbs. and the total weight of the engine and tender is 280,000 lbs.

The table shows that at different times trains of over 4,000 tons of cars have been taken from Cheyenne to North Platte, but the most interesting train is the last one, consisting of 134 steel coal cars weighing 7,765 tons. This train was started from Archer, a station eight miles east of Cheyenne, but a very heavy snowstorm set in and it was thought best to divide it at Egbert after a run of 24 miles, as the men were, of course, unaccustomed to operating trains of such great length. The maximum grades between Cheyenne and Sidney, 102 miles, vary from 32 to 35 ft. per mile. The 24 miles were run in 45 minutes owing to the engineman letting the train get too high speed at the beginning, and he also used the driver brakes too much and heated the tires; the air brakes on every other car of the train were cut out. The train was fairly well controlled, however, and it is thought that it could have been run through with safety, had it not been for the severe storm, or had the trainmen been more accustomed to handling such long trains. At Egbert the train was divided into two sections. This train was over a mile long, and so far as we know is both the longest and heaviest train ever run.

March Accidents.

Our record of train accidents in March, given in this number, includes 82 collisions, 116 derailments and 6 other accidents, a total of 204 accidents, in which 37 persons were killed and 168 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.

	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	8	0	0	8
Misplaced switch	1	2	3	6
Failure to give or observe signal	3	1	9	13
Mistake in giving or understanding orders	0	3	0	3
Miscellaneous	3	1	5	9
Unexplained	15	10	18	43
Total	30	17	35	82

DERAILMENTS.

Broken rail	3	Derailing switch	1
Loose or spread rail	5	Failure to observe signal	1
Defective bridge	4	Track repairers	2
Defective switch	1	Bad switching	2
Defective frog	2	Bad loading	1
Broken wheel	6	Animals on track	1
Broken axle	9	Landslide	3
Broken truck	3	Washout	4
Failure of drawbar	2	Snow or ice	3
Failure of drawbar and automatic application of air brakes	1	Malicious obstruction	2
Broken water scoop	1	Accidental obstruction	2
Loose wheel	1	Unexplained	54
Misplaced switch	2		116

OTHER ACCIDENTS.

Boiler explosion	1	
Explosion of oil	1	
Cars burned while running	1	
Various breakages of rolling stock	2	
Other causes	1	
		6
Total number of accidents		204

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	15	0	15	7
Defects of equipment	8	23	3	34	17
Negligence in operating	31	9	2	42	20
Unforeseen obstructions	0	15	1	16	8
Unexplained	43	54	0	97	48
Total	82	116	6	204	100

The casualties may be divided as follows:

Killed.	Collisions.	Derailments.	Other accid's.	Total.
Employes	9	17	2	28
Passengers	5	2	0	7
Others	1	1	0	2
Total	15	20	0	37
Injured.				
Employees	29	30	2	61
Passengers	64	33	7	104
Others	0	0	0	3
Total	93	66	9	168

The casualties to passengers and employes, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	3	6	5
Defects of equipment	0	0	3	0
Negligence in operating	5	64	10	32
Unforeseen obstructions and maliciousness	1	19	6	13
Unexplained	1	18	3	11
Total	7	104	28	61

Twenty-seven accidents caused the death of one or more persons each, and 26 caused injury but not death, leaving 151 (74 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with March of the previous five years shows:

	1900.	1899.	1898.	1897.	1896.	1895.
Collisions	82	47	66	49	57	36
Derailments	116	55	98	71	72	81
Other accidents	6	3	8	3	5	9
Total accidents	204	105	172	123	134	126
Employes killed	28	31	15	32	18	21
Others killed	9	5	4	8	10	2
Employes injured	61	72	92	47	49	61
Others injured	107	72	36	39	46	19
Average per day:						
Accidents	6.58	3.39	5.55	3.97	4.32	4.06
Killed	1.19	1.16	0.61	0.29	0.90	0 74
Injured	5.42	4.65	4.13	2.77	3.06	2.58
Average per accident:						
Killed	0.18	0.24	0.11	0.33	0.21	0.18
Injured	0.82	1.37	0.74	0.70	0.71	0.63

Passengers were killed in five train accidents in March. On the first day of the month there were floods in New England, and in one case, at Farmington, Conn., there was a bad passenger train wreck. The collisions at Brazil, Ind., and Broadview, Ill., are somewhat notable by reason of the large numbers of passengers that were being carried in trains which apparently are not so thoroughly guarded against collision as is customary with passenger trains.

Two of the most notable accidents of the month, from the standpoint of the Superintendent, were the derailment at Altoona, on the 21st, and the rear collision near Newark, N .J., on the 8th. In the latter case the engineman admitted that he neglected to bring his speed under control as soon as he saw the block signal (which was against him); he expected the signal to change to all-clear before he reached it. This kind of risk-taking is, no doubt, indulged in to a considerable extent by many enginemen; but they do not always get caught at it.

We have again to report the case of a freight car derailed and pushed out of a train without causing the stoppage of the train and without the accident being discovered by the trainmen. If this kind of thing keeps on, the number-takers at the division terminals will have to keep their wits sharpened or there will some day be a lost-car case which nobody but a novelist can explain.

There was a serious passenger train accident in Canada in March and one in Mexico. Near Burkton, Ont., on the Canadian Pacific, a whole passenger train fell down a bank while running at full speed, but there was a heavy body of snow on the ground and the passengers all escaped serious injury. The Mexican accident, reported from Laredo on the 27th, was a rear collision due to a runaway train on a steep grade. Two passengers were killed.

Electric car accidents in the United States in March were very few; we find reports of only seven, and but one of these was fatal. The number of persons injured in the seven accidents was 21. The fatal accident was at Red Rock, Pa. One passenger was killed and eight were injured. The car ran away on a steep grade. The coroner's jury found that the railroad company had used air brakes on its cars but had subsequently abandoned them.

Prof. Emory R. Johnson, of the University of Pennsylvania, has in the Political Science Quarterly for March a short article on "The Principles of Governmental Regulation of Railroads." Prof. Johnson aims to do nothing more than formulate the theory of the relation of state to its railroads, but he does this with skill and judgment, and his article is a model of arrangement. He considers the shippers, the public and the carrier. The state's regulation should not interfere with the normal development of the railroad system. The term "normal" may or may not include speculative railroad building, but certainly the construction of unnecessary lines for purely speculative purposes and the power to issue unlimited amounts of stock and bonds ought to be regulated. The Massachusetts anti-stock-watering law of 1894 is commended. The state should see that railroads are developed according to the industrial and social needs of the country. There is danger in giving state commissioners power to grant or deny the right to build a railroad; nevertheless the public benefits outweigh the public harm. The state should foster co-operation in railroad management. Competition in rate making is vicious, but competition in service is beneficent. Industrial competition of one region with another is so far-reaching in its influence as to be perhaps the most powerful regulator of railroad rates. Rates should be uniform to all persons within a given area for substantially similar services, and for dissimilar services the rate should tend to secure to the producer the natural economic advantages of his environment. A workable theory of rate making has not yet been formulated, and probably is an impossibility. Charges should be determined, more than they now are, by the value of the commodity carried. From the standpoint of the public as a whole, rates ought to be more "socialized"; that is to say, they should be made primarily with reference to the needs of society and only secondarily on the cost or value of each particular service. The state should not adopt specific measures preventing capital from earning a fair return; and, while not making the serious mistake of adopting state ownership, should endeavor to adjust charges so as best to promote the industrial and ethical progress of society as a whole. The different states of this country have now regulated railroads 25 years and the Federal Government has done so for 10 years. These activities have served rather to reveal the difficulties than to enable us to overcome them; but progress has been made and it has shown the desirability of continuing the Commission system of regulation.

In England, as in America, the prevailing activity and consequent high prices in all kinds of industries has increased the expenses of railroad companies in many lines and there, as here, there is some disposition among the roads to increase rates. We have not yet noticed actual increases on important roads, except for the transportation of coal; but, according to the Railway News (London) of April 7, the railroad companies (meaning, presumably, all of the large ones) now contemplate, without embarking upon any general all-around increase, an advance in excursion and tourist fares, a considerable advance in the charge for collecting baggage at residences and sending it in advance of the passenger, and the establishment of a moderate charge for demurrage and storage (on freight) where hitherto there has been practically no charge. The account in the Railway News is devoted chiefly to explaining the reasonableness of these advances and to showing the unfair attitude of the critics who claim that any increase in passenger or freight rates is contrary to public policy. The charge for sending a wagon to a residence for baggage has been, we believe, only 12 cents. This service proves much more popular than had been expected and it is found that the charge does not cover expenses. The rate is to be increased. It appears that in storage on freight and demurrage on freight cars the principal change proposed is an enforcement of rates which have heretofore been on the tariffs but have been very loosely applied. A charge is to be made where a large shipment of freight has to be delivered to a number of consignees. In a general way it may be said that the situation of the English railroads

is very much like that in this country, and the attitude of the English public appears to be about the same as that of the American; so that the problems over there are similar to ours. Our freight managers who had so much difficulty, a couple of months ago, in advancing freight rates a little (only enough to put them back where they were before some unnecessary reductions were made in them) will, however, be interested in the fact that two of the principal roads in Scotland, in their efforts to prepare for higher prices for materials, raised the rate for carrying coal to the principal cities only *six cents a ton*. If American traffic managers could find it practicable to "touch" their customers only to the extent of a third of a cent on each hundred pounds they probably would avoid a great deal of friction.

President John M. Hall, of the New York, New Haven & Hartford, in a statement concerning the purchase by that road of the New Haven Steamboat Company, says that considerable quantities of freight from north of New Haven and also from Middletown, and perhaps from the Naugatuck Division, which now are carried to New York by rail will probably be sent by steamboat from New Haven; and that this change will effect an improvement in time as well as a reduction in cost. As is well known, freight to and from New York City over this road by the so-called all-rail route is carried (in the cars) on floats some six or eight miles, between Harlem River station and the terminals on the East River in the lower part of the city. This is slow as well as expensive. To take the freight out of the cars at New Haven and put it aboard the steamer for the 75-mile trip to New York will add a few cents to the cost per ton, but the saving in room required at the New York terminal, where land is very costly (with possibly some advantage from the different location of the steamboat company's wharf) will probably mean a considerable reduction in expense. The reduction of the rail journey by 70 miles does not by itself make a great saving, and it is partly offset by the cost of the steamboat service; but 24 hours' time, more or less, will be saved for each car, and if there is plenty of track room at New Haven there will doubtless be a marked saving by relieving the crowded Harlem River yard.

Dr. Williams on Examinations for Defective Vision.

Dr. Charles H. Williams, of Boston, whose work in the examination of railroad men for defects of vision and color perception is already well known to the readers of the Railroad Gazette, read a paper before the New England Railroad Club, at its meeting of April 20, giving in considerable detail the reasons why it is necessary to make two different tests, worsted and lantern, in order to get a thoroughly satisfactory record of every person examined. We give herewith an abstract of this address. The full paper will appear in the Proceedings of the New England Railroad Club.

The speaker began with an outline of the general problem of securing railroad employes with perfect vision, emphasizing the fact that there are more cases of defective vision, nearsightedness, etc., than of color-blindness, and that of the color-blind cases not all are of the worst class. Defective perception for yellow and blue is comparatively rare. Cases where the inability to distinguish colors is wholly in the central part of the retina are likely to be found due to excessive use of tobacco or liquor. In these cases the subject may distinguish colors nearby, if the object is large, while he will fail on an object at a distance. Dr. Williams has found four cases of this kind during the past year.

Dr. Williams justified his detailed treatment of the subject before the Club by stating that some members of the Club still doubt whether there is much color-blindness or whether it will incapacitate anyone from distinguishing between red and green signals. About two months ago Dr. Williams, by the use of his lantern test, detected a bad color-blind who had been twice examined with the Thomson stick and had passed a satisfactory examination. Dr. Williams did not say whether this showed improper testing, or faded worsteds, or unreliability of the worsted test, by itelf.

On the Burlington road, where Dr. Williams served for six years, many applicants for employment are rejected for physical defects; and these rejected men go to other roads and get employment. In the year ending Jan. 31, 1900, the rejections on account of lack of acuteness of vision numbered 467; defective color perception, 61; defective hearing, 28. The speaker told of a fireman who not long ago was dismissed from the service of an Eastern road on account of defective color perception, who went South and got a place as engineman, and on his second trip ran past a red signal, had a collision and was killed. In another case, where, on account of feeble color-perception, a mistake was made by a man when fatigued (he had been on duty 17 hours), it appeared that the man if fresh and rested could pass the tests all right.

Dr. Williams uses the worsted test, no colors being named, and follows this with a lantern test, requiring the person examined to name the colors. Dr. Williams made his first lantern about 10 years ago, improving on the Donders lantern. Prof. Scripture's first lantern was made five year ago. The speaker criticised the latter as not having enough different shades of red and green and as not affording sufficient variety in the sizes of the different color areas. It is also desirable to show one or two colors at a time, and not constantly show three; daylight (white) and the lamp light (yellow) should not be used with the same glasses, as the effect is not alike with the two lights.

Dr. Williams' latest pattern of lantern is shown in the accompanying engravings. This, we understand, is the pattern now in use on the New York, New Haven & Hartford. This lantern is five inches wide and 12 inches high. The lower disk has five red and five green glasses, of different shades, one yellow, one blue and one colorless. The upper disk has "smoked" glasses of three different shades and some clear openings. Between the disks is a movable diaphragm which regulates the size of the color area. Inside of the lantern are two pieces of ground glass which can be used to give the effect of fog.

Dr. Williams would require enginemen and firemen to pass both the worsted and the lantern test, but



Lantern for Testing Eyesight.

for men not on the forward end of the train he would deem it sufficient if a man passed the lantern test and the rose test (with worsteds) even though some mistakes were made with the green worsteds. Defects in acuteness of vision are more common than defects of color perception; not only this, but they are much more likely to be acquired; so that the examinations should be repeated about every three years on this account alone. Dr. Williams found cards of letters printed for testing acuteness of vision were often unsatisfactory on account of variations in the size of the letters. There is a lack of conformity to standards even in different cards issued by the same publisher. Dr. Williams therefore had some test cards made with great care by the draughtsmen of the New York, New Haven & Hartford, and these are printed by the Rand-Avery Supply Co. He has three separate cards for a 20-ft. view, and the same for 30 ft., 40 ft., etc. He has other cards showing pictures of semaphore signals which, at 20 ft., represent a standard semaphore at half a mile. Speaking again of the effect of fatigue, mention was made of a test of enginemen on the Burlington road in 1898, which showed that men who had made a run on a clear night, with a full moon and medium temperature, showed acuteness of vision about one-quarter less at the end of the run than at the beginning. This appears to refer to a run of 200 miles on a fast train. It is believed, though apparently not proved, that color perception as well as acuteness of vision is similarly affected by fatigue.

Dr. Williams' paper is supplemented by extracts from the regulations of the New York, New Haven & Hartford for examinations of vision, color sense and hearing.

National Association of Manufacturers.

The fifth annual convention of the National Association of Manufacturers of the United States was held in Lorimer Hall, Tremont Temple, Boston, Mass., April 24, 25 and 26.

The meeting was opened shortly after 11 o'clock a. m., Tuesday, by an address of welcome by Mr. James J. Myers, Speaker of the Massachusetts House of Representatives, representing the Governor of Massachusetts. He was followed by the Hon. Thos. N. Hart, Mayor of Boston. Mr. Theodore C. Search, President of the Association, then took the chair and read his annual report.

The second session was called to order at 2 o'clock, when the reports of the Secretary and Treasurer were submitted. The reports of the committees on "International Freight and Transportation" and "Parcels Post" were read.

The third session opened at 10 o'clock Wednesday morning, when the President's report was discussed.

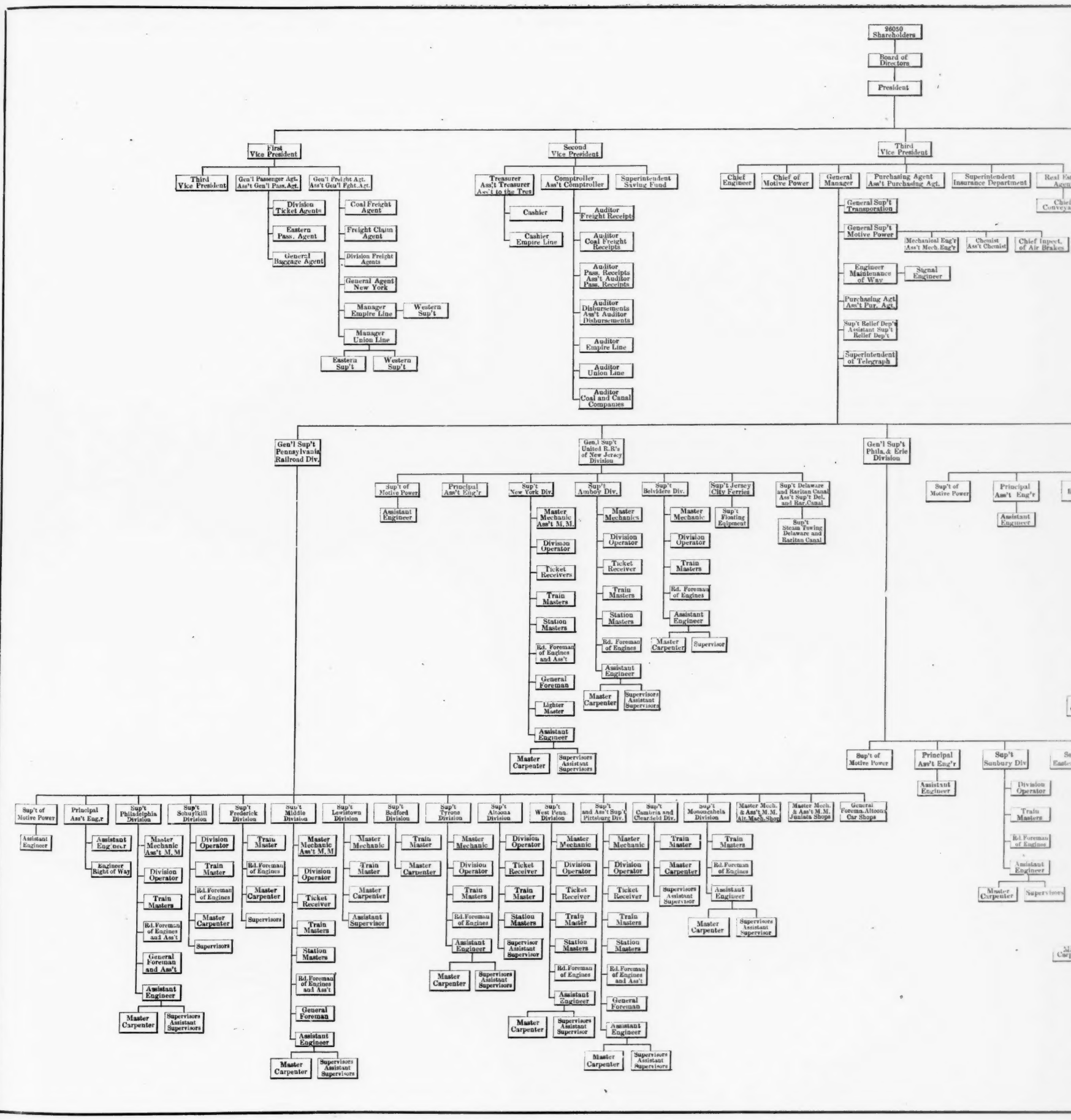
At the fourth session, Wednesday afternoon, reports from various committees were made. In the evening a public meeting was held to discuss matters relating to Freight Trade. The speakers included Mr. John C. Eames of New York ("Foreign Trade in American Cotton Goods"); Hon. William B. Rice of Boston ("Possibilities of Foreign Trade in American Shoes"); Mr. Richard Young of New York ("The Evolution of Leather Making in America and the Possibilities of Export Business") and Mr. Edward H. Sanborn of Philadelphia ("Packing Goods for Export"—illustrated with stereopticon views).

The schedule for the last session of the convention, which was held after this paper went to press, included election of officers, selection of next place of meeting, unfinished business, miscellaneous business and informal discussion.

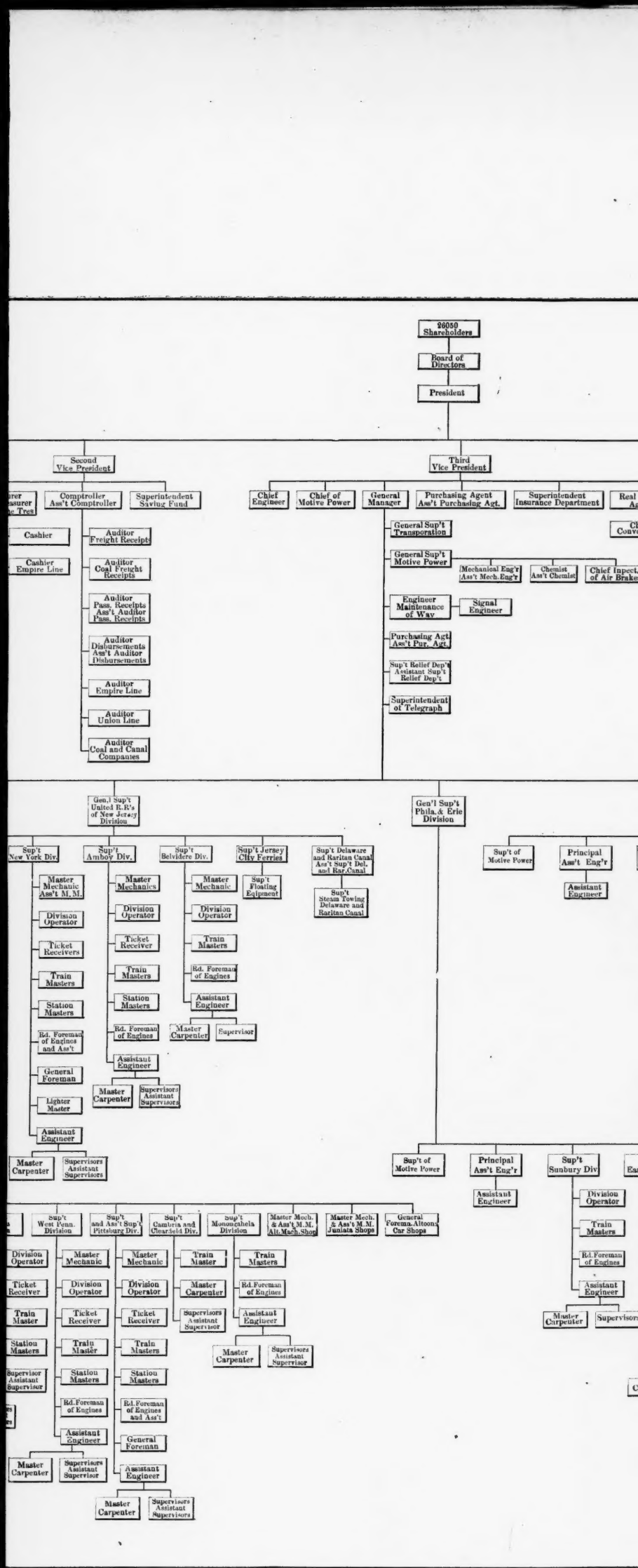
The entertainment features of the meeting, especially where the pleasure and comfort of the visiting ladies were concerned, were elaborate. The Bijou Theatre was given by the proprietor for a smoker and entertainment Tuesday evening; the Algonquin Club extended the privileges of its house to visiting members and guests; the New England Telephone & Telegraph Co. installed a special booth in Tremont Temple for free use, and the Western Union and Postal Telegraph-Cable companies permitted all registered members and guests of the convention to send over their lines, free of charge, personal messages. To the ladies were extended the courtesies of any theatre in Boston, cab service, carriage drives and various receptions and luncheons. Thursday evening the citizens of New England gave to the members of the National Association of Manufacturers coming from points outside of New England a reception and banquet. This was held in Mechanics' Building, and it was expected that it would be attended by members of the Cabinet and others identified prominently with politics and society.

Pneumatic Tools at Home and Abroad.

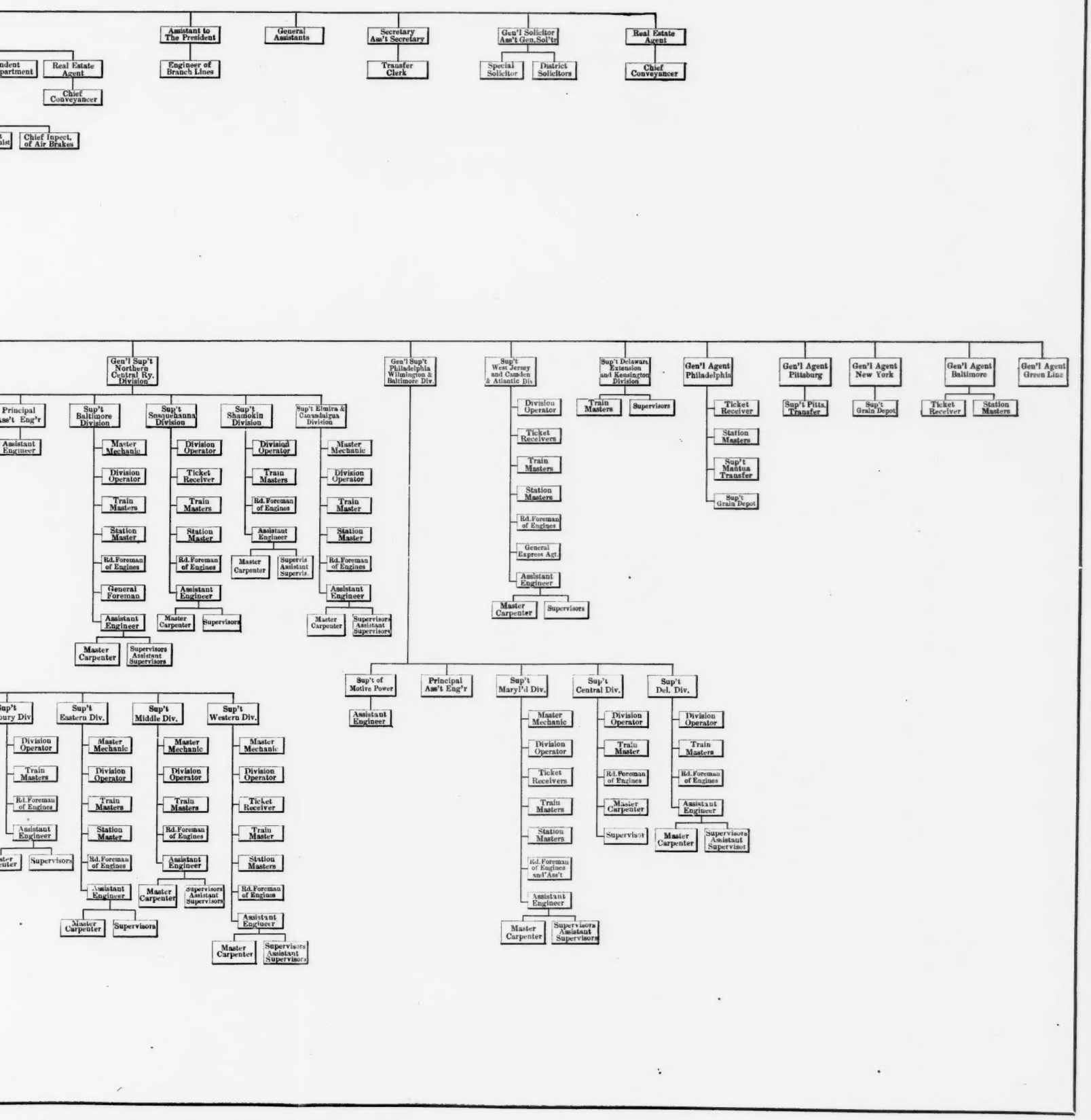
A recent meeting of the Institution of Mechanical Engineers (British) was given up to discussion of pneumatic tools and power hammers. Among the speakers were Messrs. Simpson, of Pimlico; Ivatt, of the Great Northern Ry.; Fielding, of Gloucester; Martell, of Lloyd's Registry, and J. W. Duntley, President of the Taite-Howard Pneumatic Tool Co. of London and of the Chicago Pneumatic Tool Co. In the course of his remarks Mr. Duntley said that he had been making pneumatic tools for five years. During the first year they were in business, they made 100 machines; last year they averaged 800 a month. At present they were building new works, and expected to double their production. By aid of these tools Messrs. Cramp of Philadelphia had been able to overcome the results of a strike of 7,000 men, and in one ship they had just built, all the rivets were closed by pneumatic machinery; as a consequence, Messrs. Cramp had given a duplicate order for the pneumatic machines. A proof of the superiority of pneumatic riveting was given in the fact that the rivets themselves were ⅛ in. longer than for hand riveting, and this additional metal had to be closed into the holes, thus showing the latter were better filled by the use of the pneumatic riveter than by the hand hammer. Another proof was given in cutting up work. With ordinary hand riveting, if the ends of the rivets were cut off, the shank would fall out from the holes in the plates, but when the rivets had been closed by the pneumatic machine, they had to be driven out. The speaker himself was not a skilled operator, but in a contest in Germany he had beaten the hydraulic riveter. Ninety-seven per cent. of the railroads in the United States were using these tools, and the speaker gave a large number of instances in which air machines were used for superseding hand work. In the United States Government shipyards, they used the pneumatic hammer for scaling ships, and it was found



ORGANIZATION OF THE PENNSY



ORGANIZATION OF THE PENNS



CNNSYLVANIA RAILROAD.

to be a great improvement on the old method. Another use for pneumatic machinery was in breaking up iron or steel vessels. They had what was called a "biter" or "nibbler," which chewed off the heads of the rivets in place of cutting them by chisel and hammer. He had worked two years with Cramp's before he could persuade them to give him an order.

70,000 Lbs. Capacity Cars for the Philadelphia & Reading Railway.

The new gondola cars of the Philadelphia & Reading are in several respects different from any heretofore built, being an adaptation of a pressed steel underframe to the railroad's standard design of 34-ft. flat-bottom gondola car with drop doors. The wood sides and floor are retained, and as this general arrangement is favored by a number of mechanical men who are now considering steel cars, the Philadelphia & Reading design is illustrated quite fully. One thousand of these cars were ordered in November last from the Pressed Steel Car Company and have the following general dimensions:

Length over all	38 ft. 4 in.
Width over side stakes	9 ft. 3¾ in.
Height to top of brake wheel	7 ft. 4⅝ in.
Coupled length	87 ft. 9¾ in.
Length over end sills	35 ft. 10½ in.
Width over side sills	9 ft. 4 in.
Height from rail to under side of side sill	2 ft. 5 in.
Center of drawbar from rail	34½ in.
Length between end planks	34 ft.
Width between side planks	8 ft. 10¼ in.
Height of side planks above floor	30 in.
Center to center of trucks	24 ft. 6 in.
Truck wheel base	5 ft. 2 in.
Total wheel base	29 ft. 8 in.

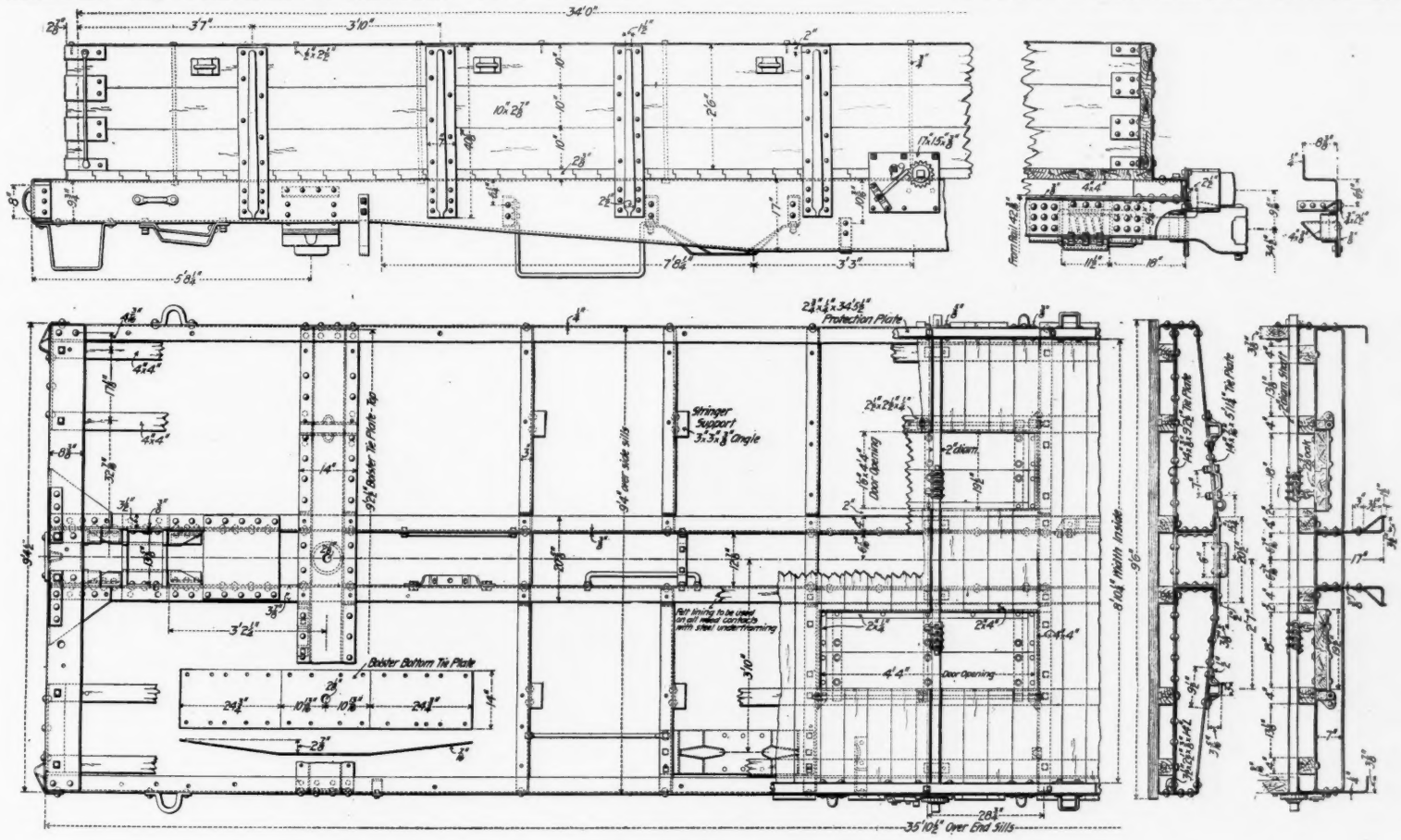
Sills.—The side sills are made of pressed steel, 10 in. deep at the ends and 17 in. deep at the center, of channel form, ¼ in. thick with 3⅞-in. flanges extending from end sill to end sill, and securely fastened to them by rivets through the top, bottom and side flanges. The side sills also connect with the center sills through the body bolster and transverse diaphragms, as shown in the engravings.

The center sills are also of pressed steed, 10 in. deep at the ends and 17 in. deep at the center, of channel form ⅜ in. thick, with 3⅞-in. flanges. They terminate at each end of the car at the face of the rear draft lugs and are securely tied together by top and bottom cover plates between the body bolster, and at the rear draft lugs by top and bottom cover plates, center plates and center braces and by transverse braces, spaced at intervals between the two body bolsters.

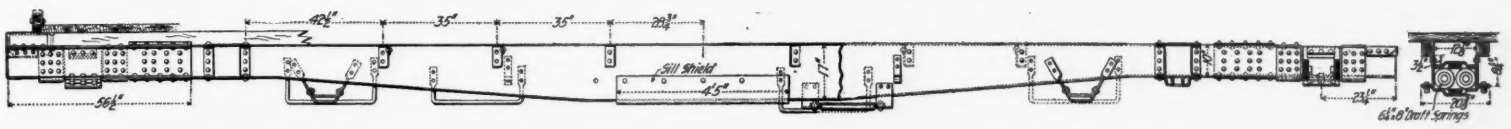
The draft sills are 9¼ in. deep, of ⅜-in. metal. They are of channel form, with flanges 3⅞ in. high, connected with the center sills and extending to the face of the end sill, securely spliced to the center and end sills.

phragms, body bolsters and end sills as shown. The floor is made of 2⅜-in. oak planks 6¼ in. wide over all. The sides are 30 in. high, being made of three pieces of yellow pine 2⅞ in. thick x 10 in. wide. The side planks are held in place by eight pressed steel side stakes extending from the top of the planks and securely riveted to the side sills. The side stakes are fastened to each side of the plank by buttonhead rivets on the inside of the plank. Secured to the top side planks, as shown in the engravings, are 12 auxiliary stake pockets.

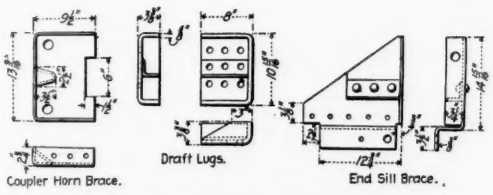
Drop Bottom Doors.—There are two doors extending from the center and intermediate stringers on each side of the center of the car. These are hinged



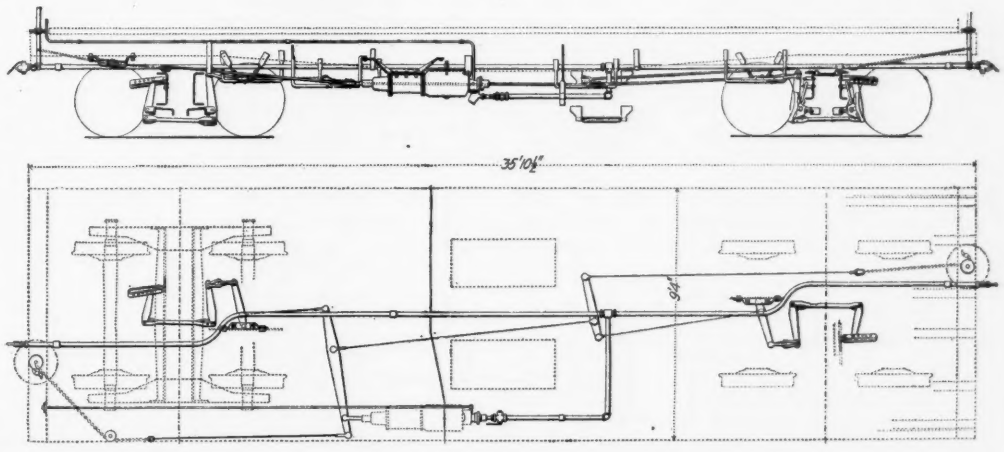
70,000 Lbs. Gondola Car with Steel Underframing for the Philadelphia & Reading Railway.



Outside and Center Sills—70,000 Lbs. Gondola Car.



Details of 70,000 Lbs. Gondola Car.



Brake Rigging of 70,000 Lbs. Gondola Car Built by the Pressed Steel Car Co.

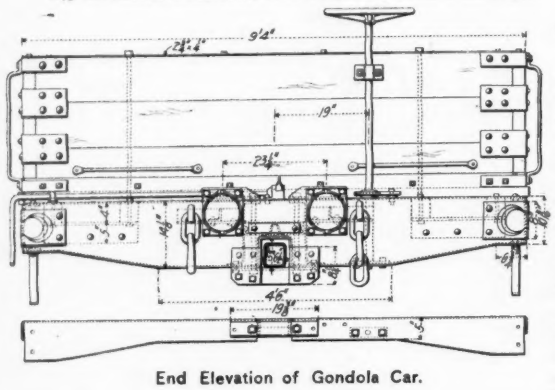
The end sills are ¼ in. thick, formed and flanged on the top, bottom and ends, for connections with draft sills and side sills. They have an opening 6½ in. wide formed at the center for the coupler, and reinforced in front of the striking horn of the coupler by a bar ¾ in. thick extending over the draft sill. The end sills are further reinforced at this point by pressed steel brackets ⅜ in. thick, flanged on three sides, these being riveted through flanges to the end sill and the draft sill. At each corner of the end sill is riveted a pressed steel corner band forming a push pocket.

Floor Stringers, Sire Planks, etc.—There are two center, two side and two intermediate floor stringers made of yellow pine 4 in. wide x 4 in. deep. These are bolted to the center sills and transverse diato the intermediate stringers by three wrought iron hinges on each door and made to close up tight against the intermediate stringers and door fillers. Each door is made up of two pieces made of white oak. As shown in one of the details, the doors are raised by a winding chain and shaft.

Draft Gear.—The draft gear consists of a 4-in. x 1-in. Gould coupler yoke in combination with the twin-spring drawbar attachment. The follower plates, 1¾ in. thick, are at each end of the draft gear, as shown in the general plan. The draft yoke has a ¼-in. fillet on the inside back corners and the drawbar follower is made round to fit into the fillet. The draft rigging at the end sills is supported by a rolled angle 4 in. x 4 in. x ⅞ in., which is put under the coupler stem and firmly fastened to the end sill by

two 1¼-in. bolts and two ¾-in. thick splice plates which are riveted to the end sills and bolted by ¾-in. bolts to the carrier angles. The draft gear is supported by a carrier plate ⅜ in. thick pressed to the required form. Stops for the follower plates are made of steel ⅝ in. thick pressed to the required form and riveted to the web of the draft channels at a proper distance apart in order to receive the draft springs of the follower plate. All draft lugs are put on the draft sill, so that there will be a uniform contact with the follower plates when in position. All holes for connecting the draft channels and stop lugs are reamed for ⅞-in. rivets. The coupler will be worked by an uncoupling rod one inch in diameter held in place on the end sill by malleable iron brackets as commonly used with the Gould coupler. The top follower guide is made so as to prevent side motion of the top side of the drawbar yoke.

Draft Springs.—Each draft spring is made of two coils of crucible cast steel, 6¼ in. outside diameter, 2⅛ in. inside diameter, and not more than 8 in. high.



End Elevation of Gondola Car.

The diameter of steel and number of coils for each spring is such that the springs have a free movement of 2⅛ in. with a pressure of 22,000 lbs. There will be two at each end of the car. The springs, which are guaranteed for three years, conform to the Philadelphia & Reading specifications for helical springs.

Brakes.—The engraving of the details of the brake rigging shows the connections of both the air and the hand brakes. Each wheel has an inside hung brake. The brake ratchet pall rests on top of the end sill through which the brake passes, on which the brake ratchet wheel rests as shown. The top and bottom flange of the end sills act as a guide for the bottom of the brake mast.

Other Details.—Both ends of the cars are equipped with safety chains, fastened as shown in the illustration.

The body bolster consists of two diaphragms of ½-in. metal between the center sills, and two diaphragms of $\frac{5}{16}$ in. metal between the center and side sills on each side of car, securely riveted together by top and bottom cover plates and body center plate.

The 12 transverse braces of the bolster on each car (as shown in the end elevation) are made of channel forms 7 in. deep, ¼ in. thick, with flanges 3 in. high. These diaphragms form the supports of the intermediate stringers, and also tie together the center and end sills.

These cars are equipped with the standard Fox truck, made by the Pressed Steel Car Company, but having all the necessary holes for attaching the P. & R. standard details. The journal boxes are of the M. C. B. standard for 4½-in. x 8-in. journals, except that the top is provided with a spring seat and the sides with ribs to guide the box in the pedestal of the truck. Each box has a Morris pressed steel lid and a Soule raw hide dust guard.

TECHNICAL.

Manufacturing and Business.

Albert C. Ashton, Secretary and Treasurer of the Ashton Valve Co., Boston, Mass., has gone to Europe on a business and pleasure trip. While in Paris, Mr. Ashton will superintend the installation of the exhibit of the company at the Exposition, which will be the largest and most complete display the company has ever made.

The St. Louis, Kansas City & Colorado will want, for new road now being built, three water stations and one standpipe.

The foreign representatives of the American Steel & Foundry Co., of St. Louis, are Dutilh-Smith, McMillan & Co., with offices in Philadelphia and at 29 Great St., Helens, London, E. C., England.

D. L. Gillespie & Co., of Pittsburgh, Pa., have contracted with the British Westinghouse Electric Co. to furnish all the lumber for the new plant at Manchester, Eng. The contract, it is said, will amount to between $300,000 and $400,000.

The International Pneumatic Railway Signal Co., of Rochester, N. Y., has sent a model of one of its low-pressure pneumatic interlocking machines to the Paris Exposition. This is the type of machine now made by the Standard Railroad Signal Co., of Troy, N. Y., and which has lately been put in use on the Erie Railroad at Jersey City. The International Company, which is affiliated with the original company at Rochester, has been formed for the purpose of introducing the low-pressure apparatus in foreign countries.

Iron and Steel.

The Jackson, Sutter & Amador will want bids about June 1 for rails. See Railroad Construction column.

The Elkhart, Mineral Wells & Improvement Co. will ask bids within 90 days for two miles of 20-lb. rails. See Railroad Construction column.

The Pusey & Jones Co. of Wilmington have a contract with the Government for building a steel hull for a caisson for No. 2 dry dock at the Brooklyn Navy Yard.

Thos. A. Gilkey, Pittsburgh, Pa., has been appointed Structural Engineer to the Colorado Coal & Iron Co., Pueblo, Col.

Dispatches from Glasgow report a slump in the pig iron market of 1s. 6d.

The American Steel & Wire Co. last Saturday announced a cut of $20 a ton for all its products with the exception of annealed fence wire, the cut on which was $18. This cut was made, so it was stated, to get rid of some of the accumulated finished material. The American Steel & Wire Co., which was under contract with the Federal Steel Co. to receive 200,000 tons per annum, 60,000 tons of which has been delivered, has arranged with the Federal Steel Co. for a temporary cessation of delivery of steel until the 12 mills which were closed last week are again in operation. The Federal Steel Co. on April 23 closed three rod mills at the plant of the Illinois Steel Co. at Joliet, Ill., which were supplying rods to the Wire Company. The Wire Company has recently added more land to its holdings on Neville Island in the Ohio River near Pittsburgh, Pa., where its works are to be consolidated.

F. F. Anderson, heretofore Assistant Purchasing Agent of the Pressed Steel Car Co., Pittsburgh, Pa., has been appointed Purchasing Agent, and J. J. Scully succeeds him as Assistant Purchasing Agent.

Carl Adam Frunck, Chief Chemist and Manager of the Furnace Department of the National Steel Works at Sharon, Pa., was run over and killed by a freight train at New Brighton, April 19.

The British steamship "Samoa" cleared from the Maryland Steel Co.'s works at Baltimore last week with 8,700 tons of rails for Vladivostock, Russia.

One of the largest transactions of the past week in the Pittsburgh District was the Pullman Company's order for 2,400 tons of No. 2 and No. 3 iron for delivery in June, July and August.

Another New York Rapid Transit Contract Let.

John B. McDonald announced on Wednesday that the contract for building section 3 of the New York Rapid Transit tunnel had been let to Holbrook, Cabot & Day, Boston contractors, subject to the execution of a final contract. This section extends from the center of Great Jones St. north to Thirty-third St.

New Union Station at Grand Rapids.

The new union station at Grand Rapids, Mich., on which work has just been begun, will cost about $114,000. The main building will be 500 ft. long, from 50 to 58 ft. wide and two stories high, being connected by a wide, covered passage with the present train sheds; it will be of brick with a slate roof. The first floor—waiting rooms, ticket offices, etc.—will be finished in enamel brick and terra cotta. On the second floor will be rooms for the officers and reading rooms for employes. This station was designed by D. H. Burnham & Co., Architects, Chicago, and the work will be done by Mr. E. H. Barnes, Resident Engineer of the Grand Rapids & Indiana. Campbell & McNabb, of Grand Rapids, are the contractors for the entire work, which is to be finished this year.

Nickel Steel Rails.

In November, 1897, 50 tons of nickel steel rail was laid on the Cleveland & Pittsburgh RR. near New Salisbury, on a 4° 42′ curve on single track line. This rail has hardly been in service long enough to give definite information, but it is working better than ordinary steel rail. The chemical analysis is as follows:

Carbon	0.53 per cent.
Phosphorus	0.014 " "
Manganese	0.80 " "
Silicon	0.048 " "
Sulphur	0.021 " "
Nickel	3.52 " "

In our issue of March 30, p. 195, we gave the analysis of the nickel steel rails used on the Pennsylvania, west of Altoona.

Exports of British Rails.

The exports of rails from the United Kingdom in March amounted to 34,709 tons, being 9,700 tons more than in March of 1899 and nearly 10,000 tons less than in March, 1898. Something the same differences are shown in the aggregate exports of the quarter, which this year have amounted to 102,397 tons. The decline as compared with 1898 is attributed largely to the falling off in the demand for British India. In the first three months of this year 11,451 tons were sent to Egypt, 10,588 tons to Mexico, 4,899 tons to Brazil and 9,589 tons to the Argentine Republic. South Africa took 15,575 tons and Australasia 18,405. Prices have sensibly improved. The aggregate value of rails exported to March 31 was £594,755, or, say, about $28.50 per ton.

Acetylene Gas for Headlights.

The Boston & Albany Railroad has one locomotive headlight fitted for burning acetylene gas, but so far has made no real test. The company is thinking of equipping one coach for acetylene lighting, but definite arrangements have not been made.

Pipe Galleries in New York.

At a meeting of the Rapid Transit Commissioners in New York last Thursday it was decided to build pipe galleries along Elm Street and the contractor will be notified that this additional work is called for. The resolution calls for galleries between the lower side of Worth Street and the north side of Astor Place for the accommodation of pipes, wires, sewers and other sub-surface structures. The Chief Engineer is instructed to prepare detailed plans and specifications.

THE SCRAP HEAP.

Floods in Mississippi.

Widespread and disastrous floods occurred in Mississippi early last week, caused by heavy rains throughout the State and especially in the northern part. Further rains occurred the latter part of last week and the fore part of this week, so that railroad traffic has been interrupted over a large area and damages are estimated in millions of dollars. The bridge of the Louisville & Nashville at West Pascagoula was washed away on Sunday last and another large bridge nearby was badly damaged. All of the other lines from New Orleans northward except the Louisville & Nashville had been obliged to suspend traffic on the previous Tuesday or Wednesday. The Mobile & Ohio was blocked between Meridian and Enterprise, Miss. Many highway bridges were destroyed at Columbus, Miss., and elsewhere. On Tuesday of this week traffic had been resumed on most lines, though over very imperfect tracks. At West Pascagoula a ferry was improvised.

Wheat and Flour to the Orient.

Nearly six million dollars' worth of our flour went to the Orient last year, against about four million dollars' worth in the preceding year and nearly all of it to China, Japan, and Asiatic Russia. Shipments of breadstuffs in the form of wheat to the Orient have been in the past rare, and the large shipments of wheat to Japan just announced shows the growing demand for our breadstuffs in that section of the world.

Nicaragua's New Railroad.

President Zelaya has made plans, according to a newspaper dispatch from New Orleans La., to build a railroad from a point on the eastern short of Lake Nicaragua, across from the capital Managua, to run east about 125 miles through a mountain pass to the head of the Bluefields River, and thence down that river to Rama. This town is situated about 70 miles from Bluefields and near the head of river navigation. The line will open up a new coffee country. The President's plan for raising the required funds is to sell $500,000 of the bonds at 85 and to accept the bonds at par in payment of duties.

Chicago Street Railroad Consolidation.

The arrangement by which the Chicago Union Traction Co. acquired control of the Chicago Consolidated Traction Co., the details of which were published in this column some time ago, was closed last week. The Union Traction Co.'s system now includes 503 miles of cable and electric trolley lines and its total capital liabilities above the common stock amount to $68,000,000, or about $135,000 a mile. The system will be managed by the present officers of the Chicago Union Traction Co., no separate organization being maintained.

The Survey of the Great Lakes.

Rear Admiral Bradford, Chief of the Bureau of Equipment, Navy Department, in explaining to the House Committee on Appropriations the necessity for various items for the Hydrographic Office, presented the following memorandum: "Since the survey of the great lakes was completed the growth of commerce upon them has been unparalleled. Our lake fleet alone is greater than the fleet of any foreign nation, excepting those of Great Britain and Germany. In recent years the amount of tonnage annually constructed on the great lakes has been greater than that constructed on the Atlantic, Pacific and gulf coasts combined. More than half of the best steam tonnage in the United States is owned upon the great lakes. It has become necessary, in some of the shoaler straits and channels, to use a drag in order to discover isolated rocks and other obstructions of small superficial area. This work can only be done by nautical people who understand the needs of the safe navigation of ships."

Opening New York State Canals.

The Erie Canal was officially opened Wednesday and the Champlain Canal on Thursday of this week. The Black River Canal will be opened May 15.

Steamship Ivernia of the Cunard Line.

The third largest steamship in service, the new Cunarder Ivernia, arrived at New York on its first trip April 24. The Ivernia was built by C. S. Swann & Hunter, Limited, of Walsend-on-Tyne, and has the following dimensions: Length, 600 ft. over all; beam, 64 ft. 4¼ in.; depth, 41 ft. 6 in. Her gross registered tonnage is 13,799 and the net is 8,913. It is built of steel throughout and has three steel decks. The ship is divided into 11 water tight compartments and is provided with facilities for connecting and shutting off each of these divisions. Her engines are twin sets of the quadruple expansion type. She will carry 160 first-class, 200 second-class and about 1,600 third-class or steerage passengers. The special feature of this boat is the excellent quarters for the steerage passengers. They have a smoking room, two promenades, sitting rooms, washrooms and other conveniences. The ship made about 19½

miles an hour average speed on the day of the fastest run and will be counted as an eight-day boat. It is estimated that she consumes about 150 tons a day. The two ships in service which are larger are the White Star liner Oceanic and the North German Lloyd steamship Kaiser Wilhelm der Grosse.

Car Floats and Lighters for the Pennsylvania.

The Pennsylvania Railroad has given a contract to the Jackson & Sharp Co. of Wilmington, Del., for a railroad car float 250 ft. long, 33 ft. wide. The Enoch Moore & Sons Co. of the same place have a contract with the railroad company to build 10 derrick lighters for New York Harbor. They are to be 80 ft. in length, 28 ft. beam and 9½ ft. depth of hold, and are to be completed within a year.

The Bridge Builders' Consolidation.

The American Bridge Co. was incorporated in New Jersey last week, for the consolidation of bridge building concerns. It has a nominal capital of $100,000, later to be increased to $70,000,000, of which about $30,000,000 will be 7 per cent. cumulative preferred stock and about $40,000,000 common stock. J. P. Morgan & Co., New York, will be the financial agents. The new company, it is understood, will include the 28 concerns under option last fall with the exception of the Keystone Bridge Co. of Pittsburgh, which is owned by the Carnegie Company. These concerns were as follows:

A. & P. Roberts Co. (Pencoyd Iron Works), Philadelphia, Pa.
Edgemoor Bridge Works, Edgemoor, Del.
Post & McCord, Brooklyn, N. Y.
Berlin Iron Bridge Co., East Berlin, Conn.
Groton Bridge & Mfg. Co., Groton, N. Y.
Bellefontaine Bridge & Iron Co., Bellefontaine, O.
Lassig Bridge & Iron Works, Chicago, Ill.
Canton Bridge Co., Canton, O.
Buffalo Bridge & Iron Works, Buffalo, N. Y.
New Columbus Bridge Co., Columbus, O.
Pittsburgh Bridge Co., Pittsburgh, Pa.
Lafayette Bridge Co., Lafayette, Ind.
Gillette-Herzog Mfg. Co., Minneapolis, Minn.
Toledo Bridge Co., Toledo, O.
Elmira Bridge Co. Ltd., Elmira, N. Y.
Wrought Iron Bridge Co., Canton, O.
J. G. Wagner Co., Milwaukee, Wis.
Youngstown Bridge Co., Youngstown, O.
Koken Iron Works, St. Louis, Mo.
Union Bridge Co., Athens, Pa.
J. B. & J. M. Cornell, New York City.
Rochester Bridge & Iron Works, Rochester, N. Y.
Horseheads Bridge Co., Horseheads, N. Y.
Hilton Bridge Construction Co., Albany, N. Y.
Detroit Bridge & Iron Works, Detroit, Mich.
Shiffler Bridge Co., Pittsburgh, Pa.
Schultz Bridge & Iron Co., Pittsburgh, Pa.
American Bridge Works, Chicago, Ill.

I. Gifford Ladd is conducting the operations for the consolidation.

Railroads in China.

A recent cable dispatch from Shanghai says on the authority of the China Gazette that Russia has forced China to consent to the building of the Pekin-Kiakhta Railroad, which will be the eastern end of the Siberian Railroad. We do not find Kiakhta on the map, but it is quite possible that Russia has taken advantage of the present situation in world politics to get a direct line to Pekin.

A Year's Work of the General Electric Company.

The eighth annual report of the General Electric Company for the fiscal year ending Jan. 31, 1900, shows that the total sales for the year amounted to $22,379,464, and the profit on the sales was $3,805,860. The increase in the orders received over the previous year was 51 per cent. In apparatus orders there was an increase of 67.4 per cent., supply orders 38 per cent. and incandescent lamp orders 34.2 per cent. Over 10 million incandescent lamps were ordered during the year. The report shows that the policy of consolidating small lighting and railroad companies and substituting one large generating plant for two or more small ones has been continued and has caused a marked change in the character of the electrical apparatus now being bought. Large multiphase generators with alternating current distribution and rotary converter sub-stations are now, however, exclusively used in such consolidated stations when the transmission covers considerable distance. The lands of all three plants owned by the company now amount to about 174 acres and the total area of the factory buildings aggregate approximately two million square feet. The number of employees in all the works is about 12,000. Long distance transmission plants have increased during the past year. About 150,000 h. p. of large transformers of the air blast type have been sold during the year. Note is also made of the continued increase in the number of electric motors used in driving machine tools in factories. In the annual report preceding this one, the assets carried for patent franchises and good-will amounted to $4,000,000. The company now has standing on its books for the above items $2,000,000. During the year there was expended for all patent expenses $353,334.

Technical Schools.

Stevens Institute of Technology.—The contracts for the new Carnegie Laboratory of Engineering have been awarded and ground will soon be broken for the new building. The Department of Experimental Mechanics and Engineering Physics will occupy the building when completed. The first floor will contain the heavier machinery and apparatus, including an engine of the compound type so arranged that either cylinder can be run independently of the other. The second floor will be devoted to the lighter machinery and apparatus, including instruments for the calibration of instruments. This floor will be connected by a passageway to the main building and will also contain the offices for the Department. The third floor will contain a lecture room, where full-size machines can be run before an entire class in illustrating certain principles and applications which can more readily be explained by means of an actual working machine or apparatus than by an abstract lecture or text-book description. This lecture room will be provided with shafting that may be driven from the main engine, and also with connections whereby steam, compressed air and electricity may be used in experiments. The third floor will also contain a draughting room for use of the students in working out the problems in this department. A boiler house will be built adjoining the Carnegie building, which will supply steam to all the buildings on the campus. The Laboratory will be built of brick and stone.

The Institute has been presented with a complete photometric equipment by Mr. Alexander C. Humphreys, of the class of '81. The graduating class has presented the Institute with a 7½ h. p. 110-volt, three-phase induction motor and also with two 4 kw. transformers which will be used for changing the two-phase street current to three-phase currents to be used in the new motor. The Institute now has a very complete motor equipment for the electrical laboratory.

A number of inspection trips have been taken during the past term. A tour was made to the General Electric, the Schenectady Locomotive Works at Schenectady, the Niagara Falls power plant, the Westinghouse works at Pittsburgh and the Pennsylvania Railroad shops at Altoona, the Baldwin Locomotive Works and other places of engineering interest in Philadelphia. Another trip was made through New England and in connection with the work of the electrical laboratory the Edison electric illuminating station at Bay Ridge, Brooklyn, was visited.

University of Wisconsin.—The Board of Regents at its meeting last week at Madison decided to establish a School of Commerce at the University to begin with the fall term this year. Prof. W. A. Scott was made Director of the school and a Professor of Commerce will be appointed. Leave of absence until next fall was granted to President Adams, who is away and ill.

University of Nebraska.—Dr. E. Benjamin Andrews has been elected Chancellor of the University as successor to Dr. George E. McLain, who resigned about a year ago to become President of the University of Iowa.

LOCOMOTIVE BUILDING.

The Newport & Shermans Valley has ordered one locomotive from F. M. Pease.

The St. Louis, Kansas City & Colorado will want two locomotives for use on new road now being built.

The Jackson, Sutter & Amador will ask for bids on rolling stock about June 1. (See Railroad Construction column.)

The Chicago & Northwestern is getting 30 more of its class R locomotives from the Schenectady Locomotive Works, which are to be delivered between April and August this year. Some of them may have piston valves, but this has not yet been decided.

The Vicksburg, Shreeveport & Pacific has ordered from the Richmond Locomotive Works two eight-wheel passenger locomotives with 18 in. x 24 in. cylinders; 62 in. in diam. driving wheels; weight in working order 105,000 lbs., with 68,000 lbs. on drivers; wagon top type boilers 57 in. in diam. at smokebox end; 240 tubes, 10 ft. in. long and 2 in. in diam.; working steam pressure, 160 lbs.

The Brainerd & Northern Minnesota, as reported in our issue of April 20, has ordered two compound mogul locomotives from the Richmond Locomotive & Machine Works. They will have 18½ in. x 29½ in. x 26 in. cylinders; 56 in. in diam. driving wheels; extended wagon top boilers, 54 in. in diam. at smokebox end; steam pressure 200 lbs., and will weigh in working order 104,000 lbs., with 85,000 lbs. on drivers.

The McCloud River RR. Co. of California is about receiving from the Baldwin Locomotive Works a duplex compound locomotive, Class $12\frac{27}{32}$ DD, the order for which we noted in our issue of March 2. This engine consists of two six-wheel coupled engines connected back to back; the foot plates and cabs being flexibly joined so as to form one large cab, common to both engines. The throttle levers, reverse levers, cylinder cock and brake valves are connected so that when one throttle or reverse lever is moved the corresponding lever on the other engine is also moved. The engineer's position is on the right-hand side of whichever boiler is leading. This engine is guaranteed to haul 125 tons of cars and lading up a 7 per cent. grade. With this the officers of the company expect to do great work, their maximum grade being 4 per cent. The weight of the engine is 152,000 lbs.

The Minneapolis, St. Paul & Sault Ste. Marie ordered April 18 from the Schenectady Locomotive Works six consolidation locomotives, noted in April 20 issue, for delivery early in October. They will be two-cylinder compounds, the cylinder dimensions not having yet been decided upon. They will weigh about 167,000 lbs., with about 152,000 lbs. on drivers. They will have 55 in. in diam. drivers, extended wagon top type boilers, radial stays, steam pressure 210 lbs., charcoal iron tubes 2 in. in diam.; Carbon steel fireboxes; tank capacity for 6,000 gals. of water and nine tons of coal. They will be equipped with Westinghouse air brakes, Corning brake shoes, Washburn couplers, Sellers' and Ohio injectors, Jerome packings, Leach sanders, Detroit lubricators, Standard driver tires, steel wheel centers, Westinghouse friction draw gear, steel channel tender frames, Common-sense body and truck bolsters and steel driving boxes.

CAR BUILDING.

The El Paso & Northeastern is reported to be considering 100 coal cars.

The Atlantic Coast Line is having eight passenger cars built by the Pullman Co.

The Northern Pacific has ordered 400 flat cars from the American Car & Foundry Co.

The New York, Ontario & Western is having three passenger cars built by Jackson & Sharp.

The Shippers' Refrigerating Car Co. has ordered 10 additional refrigerator cars from F. M. Pease.

The Williams Oil Works are having seven cars built at the works of the Youngstown Car Mfg. Co.

The Cleveland, Cincinnati, Chicago & St. Louis is having two passenger cars built by Barney & Smith.

The Elkhart, Mineral Wells & Improvement Co. will want two cars. (See Railroad Construction column.)

The Great Northern of Canada has ordered 50 gondola, 138 box, 50 stock and two refrigerator cars from F. M. Pease.

The Jackson, Sutter & Amador will want bids about June 1 for rolling stock. (See Railroad Construction column.)

The Seattle & San Francisco Railway & Navigation Co. has ordered 50 flat cars from the American Car & Foundry Co.

Swift & Co. is said to be building a few refrigerator cars at its own shops and will probably build more there in the future.

The St. Louis, Kansas City & Colorado will want, for new road now building, 75 box cars, 25 coal cars and one combination mail and baggage car.

The Northern Pacific has ordered 500 gondola cars from the American Car & Foundry Co. We understand that this road has also ordered from this company 400 flat cars.

The Southern is receiving bids this week on 1,200 double hopper coal cars, 800 ventilated box cars, 300 40-ft. flat cars and 200 coke cars, all of 60,000 lbs. capacity. Contracts will probably be let this week.

BRIDGE BUILDING.

ALBANY, N. Y.—A resolution has been introduced in the Bath City Council requesting the Hudson River Bridge Co. to build a driveway on the Livingstone Ave. bridge.

BUFFALO, N. Y.—The viaduct which will be built over the Western New York & Pennsylvania tracks at Babcock St. will have 352 ft. of steel work, consisting of Pony truss and half through girders, and 772 ft. of masonry approaches. The estimated cost is placed at $125,000 to be divided between the city and the railroad company. Edward B. Guthrie, Chief Engineer of the Grade Crossing Commission, will receive bids in about one month.

BURLINGTON, VT.—The Central Vermont Ry. bridge over the Winnooski River, according to report, will be replaced by a steel structure.

CHESTER, PA.—The Philadelphia, Wilmington & Baltimore proposes to build a subway at the Lincoln Ave. crossing.

COLLIERVILLE, TENN.—Bids are wanted at Collierville May 17 by the Commissioners of Shelby County for an iron bridge across Wolf River on the Collierville & Fisherville road. Plans and specifications may be seen at the Chairman's office, Court House, Memphis. W. W. Barksdale, Superintendent Bridges and Public Works.

DETROIT, MICH.—The Salisbury bridge on the Dearborn road has been condemned by the Commissioners of Ecorse and Springwells townships. A steel bridge will be built, according to report.

DULUTH, MINN.—The footbridge which will be built over the railroad tracks at Tenth Ave. West, will be a Howe truss 500 ft. long, 8 ft. wide and of steel. There will be four spans, 60, 90, 108 and 92 ft. each, supported by steel piers on masonry pedestals. There will also be a steel trestle of 135 ft., divided into spans of different lengths. At the southerly end there will be a 15-ft. wide tower containing stairs leading to Railroad St. The bridge will be paid for by the city and by the following railroads: Great Northern, the Union Depot Co., the Northern Pacific, the St. Paul & Duluth, the Duluth Transfer Co., and the Chicago, St. Paul, Minneapolis & Omaha. The plans are subject to change. T. F. McGilvray, City Engineer.

ESSEX, CONN.—The Railroad Commissioners have passed an order to discontinue the highway crossings in the town of Essex on the road from Centerbrook to Deep River which crosses the Valley Division of the Consolidated RR. at two places.

FREDERICTON, N. B.—A bill is before the Legislature authorizing the Restigouche & Western Ry. to build a bridge over the St. John River.

GLENDIVE, MONT.—The County Commissioners have accepted the plans of C. F. Loweth for a bridge over Yellowstone River. C. L. Brown, Chairman County Commissioners.

GOFFSTOWN, N. H.—Bids are wanted by the Selectmen at 9 a. m., May 3, for a bridge over the Piscataquoy River. Edwin A. Blaisdell, Town Clerk; George Pattee, Selectman.

GOSHEN, IND.—The Elkhart County Commissioners are considering a new bridge across Elkhart River near Waterford.

HADLEY, MASS.—Collins & Norton, New England agents for the Pittsburgh Bridge Co., have made a contract for a bridge 69 ft. long, with a 14-ft. roadway, for the town of Hadley; also for a 50-ft. steel span, 16 ft. wide, for Hatfield, Mass.; and with the city of Chester for a 114-ft. span, 18 ft. wide, at $4,525.

HARRISBURG, PA.—The Dauphin County Commissioners have under consideration two large bridges across Darling Creek at Harrisburg.

JEFFERSON CITY, MO.—A steel bridge will be built across Moreon Creek at McCann's Ford near Jefferson City. H. S. Dewey, Road and Bridge Commissioner.

KANSAS CITY, MO.—A bridge is proposed on the county line between Jackson and Cass counties. George Bird, County Surveyor, Harrisonville, Mo., may be addressed.

KEMPTVILLE, ONT.—The City Council has appointed a committee to engage an engineer to make plans and specifications for a proposed bridge at this place.

LITTLE FALLS, MONT.—The Commissioners of Morrison County will build a new bridge across the Platte River.

LIVERMORE, ME.—At a recent special town meeting it was voted to rebuild with steel a bridge which was destroyed in the freshet of 1896.

NEW BEDFORD, MASS.—The question of completing the Fairhaven bridge over the Acushnet

River is still before the Committees on Railroads and Harbors and Public Lands of the Massachusetts Legislature, they having given hearings on the recommendations of the joint Railroad and Harbor and Land Commissions. The expense of finishing the bridge above the tracks of the New York, New Haven & Hartford in New Bedford, it is believed, will not exceed $450,000, and the Committee recommends that it be done by the city of New Bedford, the expense to the extent of $220,000 to be apportioned as has the cost for that portion which is already completed, and the balance to be apportioned 12 per cent. on the commonwealth, 33 per cent. on the N. Y., N. H. & H. Railroad, 10 per cent. on the Union St. Ry. Co., 5 per cent. on the town of Fairhaven, and the balance on the city of New Bedford. The other cities of the county of Bristol, Taunton and Fall River have withdrawn opposition, but the steam and street railroad companies still oppose the apportionment. The railroad would like to abandon its location, which is below the New Bedford station, but this will hardly be permitted by the General Court.

NEW CASTLE, IND.—Bids are wanted, according to report, until May 8 for seven steel bridges for Henry County.

NEW HAVEN, CONN.—The Berlin Iron Bridge Co. is making estimates for the proposed drawbridge at Kimberley Ave. over West River. C. W. Kelly, City Engineer. (March 9, p. 159.)

NEW YORK, N. Y.—Mayor Van Wyck has signed the bill for a bridge across the East River at Hell Gate for the New York Connecting RR., to connect the Long Island RR. with the New York Central and the N. Y., N. H. & H. The company was incorporated in 1892 to build a railroad and this bridge from Port Morris in the Bronx across Randall and Ward's islands, crossing the East River by a span about 800 ft. long, to Long Island City. The plans contemplate 3½ miles of steel viaduct. Oliver W. Barnes, of 55 Broadway, Manhattan, is the President of the New York Connecting RR. Co., Alfred P. Boller is Chief Engineer, and John McDonald, Counsel.

The Aldermanic Committee on Bridges and Tunnels has decided to report favorably the $644,000 bond issue for the bridge over Newton Creek at Vernon Ave., Brooklyn, as planned by the Department of Bridges.

NIAGARA FALLS, N. Y.—The Commissioners of the Niagara Reservation will soon meet in New York City to arrange for building a new bridge to Goat Island, for which $120,000 has been voted. Work is to be begun in time to have the bridge finished by the opening of the Pan-American Fair.

NORFOLK, VA.—F. Richardson, President of the Southern Branch Drawbridge Co., proposes to build a drawbridge over the southern branch of the Elizabeth River, for which plans and specifications have been made.

NORWOOD, O.—The city is soon to vote on the proposition of issuing $10,000 of bonds for a viaduct on Marion St.

PARRY SOUND, ONT.—Bids are wanted at once for the superstructure of a steel bridge 186 ft. long across Sequin River. W. L. Haight, Town Clerk.

PERRYBURG, O.—The Massillon Bridge Co., according to report, is making estimates for a bridge over the Maumee River for the Wabash RR.

PHILADELPHIA, PA.—The Pennsylvania RR. proposes to build a bridge across Market St. to the second floor of the Broad St. station from a new office building to be built opposite.

The matter of abolishing the grade crossings on Ninth St., on the Philadelphia & Reading, is before the City Council.

PITTSBURGH, PA.—The plans by the Pittsburgh & Lake Erie for a bridge over the Ohio River to the upper end of Neville Island have been accepted by the War Department.

PORT ANGELES, WASH.—The Gate City Contracting Co. of Port Angeles has the contract for the Howe truss bridge over the Solduck River for Clallam County. (March 16, p. 176.)

PORTSMOUTH, O.—The Scioto County Commissioners will receive bids until May 8 for a single-track steel bridge 152 ft. long over Little Scioto River at American P. O. Lafayette Jones, County Surveyor.

READING, PA.—The Reading Belt RR., organized to build a belt line around the city of Reading in the interest of the Philadelphia & Reading, will need an 800-ft. bridge over the Schuylkill River and a 450-ft. bridge over Tulpehocken Creek. (March 16, p. 176.)

RIPON, CAL.—The Southern Pacific Co. will replace the wooden bridge over the Stanislaus River near Ripon between Lathrop and Modesto with a steel structure; also the bridge across the marshes at Paradise Cut will be rebuilt.

ROCK MILLS, O.—Bids are asked until May 7 for a steel bridge of two spans, each 110 ft. long, over Paint Creek. D. R. Jacobs, County Engineer, Washington, O.

ST. ANSELME, QUE.—Reports state that the steel bridge of the Quebec Central Railroad, over the Etchemin River at St. Anselme, built in 1896, was carried away by the ice April 19.

ST. LOUIS, MO.—The St. Louis, Kansas City & Colorado wants bids on one bridge. See Railroad Construction column.

SALEM, ORE.—Bids for a bridge at St. Paul which is to be 320 ft. long, will be opened at the May term of the Marion County Commissioners.

SAN ANTONIO, TEX.—The recent report that the San Antonio & Aransas Pass Ry. lost its bridge across the Guadalupe River on the Kerrville Branch during a flood is erroneous. (April 12, p. 242.)

SAN FRANCISCO, CAL.—Bids are wanted about June 1 for the steel bridges on the Jackson, Sutter & Amador Ry. See Railroad Construction column.

A bridge will soon be built over Pit River on the Copper City Road by the De Lamar Company. H. A. Cohen, Manager.

SIMCOE, WASH.—Plans are being made for a new bridge for which it is stated bids will soon be wanted. H. F. Marble, City Engineer.

SPRINGFIELD, MASS.—A bill is pending in the General Court for a new bridge between Springfield and West Springfield, over the Connecticut River, replacing the present toll bridge. This matter has been up several times in recent years. The Committee on Roads and Bridges of the Legislature, after hearings in both Springfield and Boston, has reported a general bill appropriating $300,000 for the bridge and $100,000 for approaches, the expense to be laid upon the county and the places benefited, and the bridge to be built by three Commissioners of Hampden County. The difficulty is about a location, and the bill provides for a Commission to be appointed by the courts to determine this point and build the bridge. If the bridge is located at Bridge St., as at present, it will be 1,175 ft. long. If it crosses the river at right angles and touches Worthington St. it will be 1,115 ft. long. The latter plan, it is alleged, interferes with the yards of the Consolidated Road. The bill is now in the hands of the Committee on Counties, as a matter of secondary reference. All the plans contemplate a structure of from 57 to 60 ft. wide. It is estimated in plans submitted to the City Council last week, that the cost of the approach at Worthington St. will be $114,718. The plan for an approach on Bridge St. was estimated to cost $89,607.

THREE RIVERS, QUE.—Tenders are being received by Z. T. Desaluluiels, Secretary-Treasurer, for an iron bridge over the St. Maurice River, in this city.

TIPTON, IND.—The Tipton County Commissioners, according to report, want bids by May 11 for four bridges.

WACO, TEX.—The Southern Bridge & Construction Co. of Houston, Tex., has a contract for a 125-ft. bridge across Bosque River from the McLennan County Commissioners.

WARSAW, IND.—The contract for the foundations for three steel bridges, one 40 ft., one 110 ft. and a third of 125 ft., was let April 20 by the Commissioners of Kosciusko County, to J. D. Lindell of Valparaiso, Ind. The Bellefontaine Bridge Co. of Bellefontaine, O., received the contract for the superstructure of the three bridges. (April 12, p. 244.)

WASHINGTON, D. C.—The Senate Committee on the District of Columbia has recommended a new bridge built in place of the present Navy Yard bridge. Also that an appropriation of $100,000 be made to begin the work in accordance with plans prepared by the Commissioners and approved by the Secretary of War.

WHEELING, W. VA.—A proposed electric railroad company is required by the County Court to rebuild the bridges over Buffalo Creek on its proposed line. The work is estimated to cost $16,000.

WINNIPEG, MAN.—The Canadian Pacific has in contemplation the removal of the grade crossing at Main St. It is not decided whether a subway or an overhead bridge will be built.

WILKESBARRE, PA.—A contract has been let to the New Jersey Steel & Iron Co. for a plate girder bridge over Lauree Run at Brookside by the Wilkesbarre & Wyoming Valley Traction Co.

WILLIAMSPORT, IND.—Bids are wanted May 9, according to report, for seven steel bridges for Warren County. E. C. Livengood, Chairman County Commissioners.

WILLIAMSPORT, PA.—Sealed proposals will be received by the Commissioners of Lycoming County until 12 o'clock noon, April 27, for two steel highway bridges, one a low truss steel bridge of one span across Mill Run in Hepburn Township, the other a low truss bridge of one span across Mill Creek in Upper Fairfield Township. T. R. Winder, County Clerk.

YREKA, CAL.—Bids are wanted on or before May 19 by the Supervisors of Siskiyou County for a bridge across the Klamath River at the mouth of Horse Creek; also for bridges across Little North Fork of Salmon River.

Other Structures.

ALLIANCE, O.—The Transue & Williams Co., makers of drop forgings, have let a contract for buildings for a new forging plant on a four-acre tract recently bought at West Alliance. The size of the buildings are as follows: Main brick building, 150 x 50 ft.; iron building, 200 x 50 ft.; engine and boiler room, 25 x 50 ft. The company expects to add several hammers and special tools to its equipment. It is expected to have the new plant in operation by Sept. 1.

BARKERTON, O.—The Columbia Chemical Co., Pittsburgh, Pa., John Pitcairn, President, will enlarge the soda-ash plant, now building at this place, one-third, at an additional cost of $300,000. A number of houses will also be built for employes.

BUFFALO, N. Y.—Work is begun on the new steel plant at Stony Point for the Lackawanna Steel & Iron Co. Beside the buildings for the plant, extensive docks, warehouses and railroad switches are to be built, including a branch line to connect with the Buffalo & Depew RR.

CHARLEROI, PA.—The Union Steel Co. has decided to locate its works a short distance above Charleroi, on the south side of the Monongahela River, near Pittsburgh.

CHESTER, PA.—Work will soon be begun on the new plant of the Gruson Iron Works Co. in the Borough of Eddystone.

CONSHOHOCKEN, PA.—The Longwood Iron Co. will increase its capital stock from $100,000 to $400,000 in anticipation of enlarging its plant.

DUBLIN, GA.—The State Railroad Commission is considering the matter of a new station at Dublin.

DUNBAR, PA.—Messrs. Rogers, Brown & Co., Cincinnati, O., have secured control of the furnace and coke ovens of the Dunbar Furnace Co. The present stack has a daily capacity of 225 tons of foundry iron. As soon as a new stack now building is finished, the old furnace will be dismantled and the equipment sold. The capacity of the new furnace will be 300 tons per day.

GREENCASTLE, PA.—The Cumerland Valley RR. proposes to build a station at Carlisle and Madison Sts., Greencastle.

KANSAS CITY, KAN.—The Atchison, Topeka & Santa Fe has recently bought land in Kansas City upon which a new freight depot will be built. No plans or specifications have been made.

McADAMS, N. B.—Joseph McVey of St. Stephen has a contract for a new passenger station at this place for the Canadian Pacific. It will be built of granite and about one-half mile from the present station. It will be 133 ft. long and 36 ft. wide. The estimated cost is $30,000.

MONTREAL, QUE.—The Grand Trunk Ry. has let a number of contracts to complete its new office building on McGill St. Work was stopped last fall because the company was unable to secure the required steel. Douglas Bros. of Toronto have the contract for the roofing metal work.

NEWARK, N. J.—The Foster Engineering Co. is about to build a new plant on Monroe St., between Ferry and Lafayette Sts. The plans were made by Paul Botticher, architect, Newark.

NICETOWN, PA.—A contract for the piping for a large forge plant at the works of the Midvale Steel Co. has been let to the Benjamin F. Shaw Co. of Wilmington, Del. The contract calls for pipe 20 in. in diameter and 80 ft. long, with an auxiliary pipe 100 ft. long, and a second one of 8-in. pipe 166 ft. long.

PHILADELPHIA, PA.—The Philadelphia & Reading will build a new passenger station at Wayne Junction near Philadelphia. The new station will occupy the site of the old one and will have two waiting rooms 30 x 50 ft., separated by a covered platform 464 ft. long. The waiting rooms will be located at the Germantown Ave. and Wayne St. ends of the platforms, respectively. A new signal plant is to be built in the Wayne Junction yards to conform with the new track arrangement.

PITTSBURGH, KAN.—Contracts have been let for two new buildings for the Kansas City Southern, formerly the K. C., P. & G. One is for a storeroom 50 x 170 ft. for supplies for the entire system. The other is a freight depot. The two buildings are to cost about $40,000.

POTTSTOWN, PA.—Work is well under way on the furnaces of the Warwick Iron & Steel Co. Willauer & Missimer, the contractors for the masonry work, have finished the foundations. Messrs. Pollock & Son of Youngstown, O., have the contract for the furnaces.

ROCK ISLAND, ILL.—The Chicago, Burlington & Quincy is building a new freight house 31 x 266 ft., at a cost of $50,000. The new passenger station at Twentieth St., work on which is also in progress, will cost $50,000.

SAN FRANCISCO, CAL.—The Harbor Commissioners have taken action to authorize building four new piers between Union and Lumbard Sts., one of which will occupy the space known as the Fisherman's Wharf. The estimated cost of the piers and car ferry slips which are also to be built is $400,000. Two piers and one ferry slip to be built now will cost $200,000.

SKAGWAY, ALASKA.—The contract has been let by the White Pass & Yukon RR. for extensive terminal facilities at Skagway for handling and storage of coal, to cost $12,000. D. A. Robinson will do the work. A large steel traveling crane is to be built. The bunkers will have a capacity of 2,500 tons.

TAMPICO, MEXICO.—The Mexican Central RR. has let a contract for steel for a pier at Tampico to the Carnegie Steel Co. It is said to contain 10,000 tons of steel beams. Mr. A. J. Tullock of Leavenworth, Kan., is engineer for the work.

TORONTO, ONT.—The Canadian Pacific proposes to build a new station at Parkdale, a suburb of Toronto.

VALDOSTA, GA.—The Plant System has under consideration a new depot at Valdosta.

WILMINGTON, DEL.—Work on one of the large buildings for the additions to the Diamond State Steel Company's plant is nearly finished. The two main buildings, 437 ft. and 420 ft. long respectively, are being built by the Phoenix Bridge Co. and W. W. Lindsay & Co. of Philadelphia. A large bed plate for a 3,000 h. p. engine for driving the rolls has been set up. There are to be four electric cranes, one 75-ton, one 32-ton and two 15-ton. One large melting pan is being put up in the furnace department, and supports for the other four have been laid. Gas producers are being built.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Louisiana Engineering Society.

At a meeting of the Society at New Orleans, La., April 9, it was decided to take steps to have a law passed regulating the professional practice of engineers in the State of Louisiana. Professor John W. Ordway of Tulane read a paper on "Water Supply of the City of New Orleans."

American Institute of Electrical Engineers.

The 141st meeting of the Institute was held in New York on Wednesday evening of this week, when a paper was presented by Mr. Arthur H. Ford, entitled "Hysteresis in Sheet Iron and Steel." About 20 new members were received into the Institute at this meeting. The annual business meeting will be held in New York Tuesday, May 15, and the general meeting will begin at Philadelphia in the afternoon of May 16. The Paris meeting will be held August 16.

American Society of Mechanical Engineers.

The 41st meeting of the Society will be held at the Grand Hotel, Cincinnati, O., May 15 to 18. The opening session will be held Tuesday evening, May 15, at which time Mr. Gustav Tafel, Mayor of Cincinnati, will welcome the Society, and Mr. Charles H. Morgan, President, will respond. After the meeting an informal reception will be held. The following papers will be presented:

Wednesday Morning, May 16, 10:00.

Rockwood, Geo. I.—"On the Value of a Horse Power."

Yaryan, H. T.—"Hot Water Heating from a Central Station."
Aldrich, W. S—"Systems of Efficiency of Electric Transmission in Factories and Mills."
Guest, J. J.—"Design of Speed Cones."

Wednesday Evening.

Thurston, Robt. H.—"Multiple Cylinder Engines."
Magruder, Wm. T.—"The Gas Engine Hot-Tube as an Ignition Timing Device."
Goldsmith, N. O.—"Water Softening Plant of the Lorain Steel Co."
Higgins, M. P.—"Education of Machinists, Foremen and Mechanical Engineers."

Thursday Morning.

Herschmann, Arthur.—"The Automobile Wagon for Heavy Duty."
Cooley, M. E.—"A Test of a Fifteen Million High Duty Pumping Engine at Grand Rapids, Mich."
Goss, W. F. M.—"Tests of the Snow Pumping Engine at the Riverside Station of the Indianapolis Water Company."
Ball, B. C.—"Cylinder Proportions for Compound and Triple Expansion Engines."
Topical Discussions.—"What does it Cost to Run Trains at High Speed?" "Protection of Pen-stocks from Corrosion."

The social events and excursions will be as follows: On Wednesday morning there will be a trolley excursion for the attending ladies and on Wednesday afternoon an excursion to the plant of the U. S. Cast Steel Pipe & Foundry Co., about 12 miles down the Ohio River. On Thursday afternoon a trip will be made to the plant of the Cincinnati Oyster & Fish Co. On Thursday evening a reception and conversazione will be held at the Hotel Alms. A visit to the plant of the National Cash Registry Company at Dayton, O., is on the programme for Friday. The committee has prepared a list of 38 points of interest, including all the important engineering works in and about Cincinnati, which the members and guests of the Society can visit if desired.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. George S. Morison reached New York last Wednesday from the Isthmus. He is the last of the Canal Commissioners to return.

—Mr. W. J. Brittingham, at one time Secretary and Treasurer of the Eastern Shore (New York, Philadelphia & Norfolk), died April 18, of Bright's disease, aged 77 years.

—Mr. H. E. Parker, Superintendent of Terminals of the Chesapeake & Ohio Railway at Newport News, Va., and Miss May M. Butler were married at Pleasantville, Ia., on April 17.

—Mr. B. R. Guest, who recently resigned as Treasurer of the Georgia & Alabama (p. 262), has located in New York as a member of the firm of F. B. Guest & Company, Cotton Brokers at 11 William St.

—Mr. Richard Peck, a well-known steamboat man, died at New Haven, Conn., April 18. He was born in Flushing, L. I., in 1816. In 1850 Mr. Peck became Superintendent of the New Haven Steamboat Company and continued in that position until 1895, when he became Secretary.

—Mr. C. H. Sharman has been appointed Manager of the Sabine Land & Improvement Company at Sabine, Tex., in charge of the Terminal and town property. Mr. Sharman recently resigned as General Superintendent and Purchasing Agent of the Wabash, Chester & Western Railroad.

—Col. Sir Francis Arthur Marindin, K. C. M. G., died in London on Monday of this week. His name is known to many of our readers as Senior Inspector of Railways to the Board of Trade (British) and we have often had occasion to call attention to his reports on accidents and other railroad matters. Col. Marindin was born May 1, 1838, was educated at Eton and afterward at the military schools and became an officer of the Royal Engineers. He served with distinction and in 1887 was decorated for his work in charge of the railroads of Egypt. He was knighted in 1897.

—Mr. Salvador Potis, Chief Engineer of the Illinois Telephone & Telegraph Co., committed suicide on April 17 at his rooms at the Technical Club, Chicago. Mr. Potis was born in Venezuela 37 years ago but came to this country as a youth and received his scientific education here. For several years he has lived in Chicago, where he was well known as a mechanical engineer, and through his connection with the Yerkes street railroad system. He was a member of the American Society of Mechanical Engineers, of the Technical Club of Chicago and of other organizations.

—Mr. E. E. Brown, the new Electrical Engineer of the Philadelphia & Reading, was born in Mystic, Conn., in 1873. He received a preparatory training in the common schools of Amesbury, Mass., and at Phillips Exeter Academy, N. H. He was graduated from Worcester (Mass.) Polytechnic Institute in 1896 with the degree of Bachelor of Science, and the following year took the degree of Master of Science in electrical engineering in the same institution. The following year he entered the expert course of the General Electrical College at Schenectady, N. Y., and continued there until his appointment as Electrical Engineer of the Delaware, Lackawanna & Western in 1898. He resigned that position April 16 last to take up his new work.

—Mr. W. Cross, as already noted, has been appointed Assistant to the Manager of the Lines West of the Canadian Pacific in charge of the Mechanical Department. Mr. Cross was born in Birkenhead, England, July 6, 1842. He entered service with the Grand Trunk at Montreal in 1863. When he left that company in 1882 he had served for nine years as journeyman and foreman of the machine shop and erecting shop. He then went to the Canadian Pacific, his present company, as Master Mechanic on the Eastern Division and was transferred to the same position on the Western Division in March, 1887. Ten years later he was promoted to General Master Mechanic on the Lines West, the position he held at the time of his advancemnt on April 9 last.

—The Southwestern Arkansas & Indian Territory RR. has been reorganized under the Arkansas Southwestern and the Vice-President and General Manager will be Mr. J. A. Woodson, the Receiver of the old road. Mr. Woodson was born in North Carolina in 1848. He began railroad service in 1873 as station clerk at Pine Bluff, Ark., for the road then known as the Little Rock, Pine Bluff & New Orleans. He was station agent at Pine Bluff until 1875, when he was made General Freight Agent of the road which had been changed to the Little Rock, Mississippi River & Texas. Four years later he was made General Superintendent of the same company. He held that position until 1884, when the road having been extended to Little Rock, a traffic agreement was entered into between his road and the Little Rock & Fort Smith and the Kansas & Arkansas Valley roads. These lines were placed under one General Manager and Mr. Woodson was made General Traffic Manager. In 1887 the three properties were sold to the Goulds and were practically absorbed by the Iron Mountain System. Mr. Woodson remained in charge of freight traffic for the three lines and of the passenger business for Arkansas and Indian Territory. Resigning on account of ill health in 1891, he did not return to railroad service until 1896, when he was appointed Receiver of his present road, the Southwestern Arkansas & Indian Territory. Mr. Woodson has filled the office of Mayor for the city of Little Rock for two terms and was elected last April to a third term without opposition. He finds it necessary, however, under his new duties to resign as Mayor. Under his administration both the railroad property and the finances of the city have made marked improvement.

ELECTIONS AND APPOINTMENTS.

Algoma Central.—G. H. Cook, heretofore Engineer in charge of construction of the Southern Indiana, will take charge of extension work on the A. C.

Ashland & Wooster.—H. H. Camp has been elected Secretary.

Atlantic Coast Line.—The officers of this consolidated company are: President, W. G. Elliott, of Wilmington; First Vice-President, H. Walters, of Wilmington; Second Vice-President, Alexander Hamilton, Esq., of Petersburg, Va.; Third Vice-President, C. S. Gadsden, of Charleston, S. C., and Secretary and Treasurer, James F. Post, of Wilmington. The new Directors are: E. B. Borden, Goldsboro, N. C.; George Howard, Tarboro, N. C.; Donald MacRae and J. W. Norwood, Wilmington N. C.; Waldo Newcomer, Baltimore, Md.; Fred. W. Scott, Richmond, Va.; D. W. Lassiter, Petersburg, Va.; H. B. Short, Lake Waccamaw, N. C., and J. J. Lucas, Society Hill, S. C. B. F. Newcomer, Henry Walters and Michael Jenkins were re-elected Directors. (See RR. News column.)

Atlantic, Valdosta & Western.—E. H. Barnes has been appointed Superintendent, succeeding J. B. Cutler, resigned.

Canadian Pacific.—Roger Atkinson, heretofore Mechanical Superintendent, has been appointed Superintendent of Rolling Stock, with headquarters at Montreal, Que.

Chicago & Alton.—H. F. Baldwin, heretofore Engineer Maintenance of Way at Jersey City, N. J., has been appointed Chief Engineer of the C. & A., succeeding H. C. Draper, assigned to other duties in the engineering department. Effective April 23.

Cleveland, Cincinnati, Chicago & St. Louis.—J. H. Rupert has been appointed Foreman of Bridges, succeeding Harvey Dodge, promoted.

Columbia Southern.—G. J. Mohler has been appointed Superintendent of Construction.

Delaware, Lackawanna & Western.—C. H. Ketcham, heretofore Terminal Agent at New York, has been appointed Division Superintendent at Hoboken, N. J., succeeding Raymond Du Puy, resigned. Mr. Du Puy's resignation takes effect April 30.

Erie.—J. W. Davis has been appointed Engineer Maintenance of Way at Jersey City, N. J., effective April 21, to succeed H. F. Baldwin, resigned to go to the Chicago & Alton.
C. Steele has been elected a Director, succeeding C. H. Coster, deceased.

Erie & Wyoming Valley.—William Miller has been appointed Master Car Builder, with headquarters at Dunmore, Pa., succeeding Sidney D. King, resigned, effective April 10. J. G. Livengood has been appointed Auditor, with headquarters at Dunmore, Pa., succeeding M. Donaldson, resigned, effective April 18.

Georgia & Alabama.—J. J. Hickok has been appointed Acting Treasurer, succeeding B. R. Guest, resigned.

Kansas City Southern.—S. G. Warner, heretofore General Passenger Agent of the St. Louis Southwestern Ry. of Texas, has been appointed General Passenger Agent of the K. C. S.

Lake Erie & Western (Lake Shore & Michigan Southern).—W. White, heretofore Master Mechanic of the Illinois Central, has been appointed Master Mechanic of the L. E. & W.

Lehigh Valley.—The headquarters of W. G. Berg, Chief Engineer, after May 1 will be at the Havemeyer Bldg., New York. On April 28, the headquarters of the Purchasing Agent will be removed from Philadelphia, Pa., to 39 Cortlandt St., New York.
C. Steele has been elected a Director, succeeding the late C. H. Coster.

Louisville & Nashville.—John Fitzgerald has been appointed Superintendent in charge of the terminal facilities at East St. Louis, Ill., and St. Louis, Mo., succeeding W. S. McChesney, Jr., resigned.

Mexican National.—The Executive Offices will, on May 1, be removed to 1 Nassau St., New York.

Missouri, Kansas & Texas.—The New York offices of this company will on May 1 be removed from 45 Wall St. to 135 Broadway.

Montana.—F. T. Robertson has been appointed Superintendent, with headquarters at Lombard, Mont., succeeding G. F. Wentworth.

New River, Holston & Western.—The officers of this company referred to in the Construction column are: President, W. E. C. Merriman, Williamsport, Pa.; Treasurer, C. La Rue Munson, Williamsport; Secretary, Martin Williams, Pearisburg, Va.; Chief Engineer, S. B. Mosby, Roanoke, Va.

New York, New Haven & Hartford.—Henry D. Beach, Signal Engineer at Bridgeport, Conn., has had his jurisdiction extended over the entire Western District, effective April 16.

Oregon Southern.—The officers of this newly incorporated company are: President, E. E. Lytle; Vice-President, D. R. Budd; Treasurer, W. H. Moore; Secretary, Miss May Enright, and Chief Engineer, J. L. Jamison. (See RR. Construction column, April 20, p. 263.)

Pennsylvania Company.—F. H. Worthington has been appointed Engineer Maintenance of Way of the Indianapolis & Vincennes Division of the Southwest System, succeeding Paul Jones, transferred. G. C. Bishop, heretofore Assistant Master Mechanic of the Altoona machine shops of the Pennsylvania RR., has been appointed Assistant Engineer Motive Power, in the office of the Superintendent of Motive Power of the Northwest System of the P. C., at Fort Wayne, Ind.

San Francisco & San Joaquin Valley (A., T. & S. F.).—J. W. Walker has been appointed Superintendent of Terminals, with headquarters at San Francisco, Cal.

RAILROAD CONSTRUCTION.
New Incorporations, Surveys, Etc.

ALGOMA CENTRAL.—The Government, according to report, has decided to grant a concession of about 2,000 square miles of pulp, agricultural and mineral lands. The road, when completed, is to run from Sault Ste. Marie, Ont., to Dalton on the C. P. R., with a branch to Michipicoten Harbor on Lake Superior. F. H. Clerque of Sault Ste. Marie is President. (March 2, p. 145.)

ARIZONA ROADS.—Estimates are being prepared for a narrow-gage line from Huron on the Prescott & Eastern, to run west about 10 miles to a point beyond Big Bug. A. B. Mader of Prescott is Chief Engineer; H. B. Clifford, 10 Wall St., New York, is a projector.

BALTIMORE & OHIO.—A proposition has been made, according to report, to the citizens of Fulton County, Pa., by this company looking to the building of a branch line from Cherry Run, W. Va., to run north about 25 miles to McConnellsburg, Pa.

CALIFORNIA ROADS.—The Loyalton Lumber Co. has been granted a franchise by Sierra County for its proposed lumber line in the east end of the county from Loyalton south toward Beaver Valley. (Dec. 15, 1899, p. 871.)

CANADIAN PACIFIC.—The company has decided to build the Norwood & Apsley line from Norwood, Ont., north about 40 miles via Stoney Lake and Warsaw to Coe Hill to connect with the Central Ontario. The condition is that the promoters shall obtain both Dominion and Provincial subsidies.
A Port Arthur press report states that a new line is to be built from Fort William, Ont., to Dexter, to take the place of the present line.

CENTRAL NEW ENGLAND.—Preparations are being made, according to report, to build the loop around the Montague farm, right of way over which was adversely decided by the Connecticut Supreme Court. It is stated that branches will be built to Rainbow and to Windsor Rocks, near which the loop will run. (April 13, p. 245.)

CHICAGO & NORTHWESTERN.—The company has resumed work double-tracking its main line through Iowa. The section between Tama and Boone, 70 miles, was partly graded last fall. Grading is begun on the sections between Ogden and Jefferson, 18 miles, and Scranton and Maple River Junction, 21 miles. The track at the western end of the grading is not to be laid until next year. Work has also been resumed on the cut-off bridge over the Des Moines River west of Boone. (Dec. 1, 1899, p. 835; Dec. 29, 1899, p. 901.)

DELAWARE, LACKAWANNA & WESTERN.—Burke Bros. of Scranton, Pa., have taken the contract for re-grading and straightening the track between South Orange and Milburn, N. J., about six miles.

DELAWARE VALLEY & KINGSTON.—After numerous hearings, the New York State Railroad Commission has granted the application of this company to build a railroad from Kingston to run west 81 miles along the old Delaware & Hudson canal bed to the State line opposite Lackawaxen, with a further extension from that point of 16 miles to Hawley, Pa., there to connect with the Erie & Wyoming Valley. This proposed line is in the interest of the Pennsylvania Coal Co. Wm. V. S. Thorne of 1 Broadway, New York, is President; Chas. E. Webster is Chief Engineer. (Jan. 26, p. 63.)

EAST & WEST.—An extension is proposed, according to report, southeast to connect with the city of Anniston, Ala.

EAST SIDE.—This company has completed its line of about six blocks in the city of Olympia, Wash. It was organized solely to aid the manufacturing interests of that section of the city and is practically a spur of the Northern Pacific. Chas. Springer of Olympia is one of the officers. (April 13, p. 245.)

GREAT NORTHERN.—President James J. Hill is reported to have announced to the people of Fairhaven, Wash., that the company will build the cut-off from Fairhaven south around Chuckanut Mountain to a point near Burlington. The time for beginning work is uncertain. (Sept. 29, 1899, p. 685.)

HUNTSVILLE & LAKE OF BAYS.—The bill has passed the Canadian Legislature to incorporate this company to connect Lake of Bays on the north with Peninsula Bay and on the south with Halls Bay. McMurrich, Coatsworth & Hodgkins of Toronto are the solicitors. (Jan. 12, p. 29.)

JACKSON, SUTTER & AMADOR.—Surveys are completed and contracts are to be let about May 15 for this proposed line from Ione, Amador County, Cal., on the Southern Pacific, to run southeast 13 miles to Martells Station, with a branch four miles south to the town of Jackson, and another north four miles via Sutter Creek, Drytown and Amador City to Plymouth. (Jan. 12, p. 29.) E. Van Etten, General Superintendent of the New York Central, Grand

Central Depot, New York, is President; W. R. Woodard, 758 West Adams St., Los Angeles, Cal., is Vice-President and General Manager, and H. E. C. Feusier of Ione, Cal., Chief Engineer. The New York representative is E. Eilhuber, 220 Broadway, New York. (Official.)

KANSAS CITY, FORT SCOTT & MEMPHIS.—Work is begun, according to report, in extending the double track from Marion Park south 11.6 miles to Olathe, Kan.

LOUISIANA & ARKANSAS.—See Arkansas, Louisiana & Southern under Railroad News.

LOUISIANA ROADS.—W. N. Gunton & Co. of Rochelle are reported building a timber railroad through a portion of Grant Parish.

LOUISVILLE & NASHVILLE.—President Smith is reported to have had a conference recently with the people of Richmond, Ky., relative to the building of a branch to the Jackson County coal fields.

MANITOULIN & NORTH SHORE.—The Canadian Legislature has passed the bill incorporating this company to build from Little Current to a point at or near Sudbury, Ont., on the C. P. R.; also from the same point to James Bay; also from the same points southeast to the south shore of Manitoulin Island; also from Tobermory, Bruce County, to Meaford, Grey County. Hearst & Mackey of Sault Ste. Marie, Ont., are the solicitors. (March 16, p. 179.)

McCLOUD RIVER.—The company is making surveys for an extension of 20 miles, grading of which will be done this year. (Official.)

MISSOURI, KANSAS & NORTHWESTERN.—This line which is proposed from the Missouri, Kansas & Texas at Mineral City, Kan., east through Columbus and Galena, Kan., Joplin and Webb City, Mo., is to be built in the interest of the Missouri, Kansas & Texas. When the road is completed through trains will be run via the M., K. & T. to Kansas City and St. Louis. The road is located from Mineral, Kan., to Webb City, Mo. Contracts for grading, etc., are to be let June 15. The maximum grades at 25 ft. per mile, and the maximum curves 3 deg. (April 13, p. 246.) J. C. Stewart of Webb City, Mo., is President of the new company, and Richard Nevins, Jr., Joplin, Mo., General Manager and Chief Engineer. (Official.)

MONONGAHELA & WASHINGTON.—Plans are reported completed for the continuation of this line from Ellsworth, Pa., further into the coal territory. The line is completed from Monongahela City, Pa., southwest 12 miles to Ellsworth. (Dec. 8, 1899, p. 853.)

NASHVILLE & KNOXVILLE.—Surveys are reported in progress for a line from Monterey, Tenn., to run northeast about 16 miles to the Laurel Crook coal fields.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Locating surveys are reported completed for an extension from Hickman, Ky., into West Hickman.

NEW RIVER, HOLSTON & WESTERN.—This road is being built by the Younkin Lumber Co. and is under contract to run from Narrows, Va., west seven miles to Wolf Creek. (April 20, p. 263.) The officers are given under Elections and Appointments. (Official.)

NEW YORK CONNECTING.—Mayor Van Wyck of New York City has approved the bill passed by the last State Legislature providing for the bridge proposed by this company across the East River. The proposed route is from the Port Morris Branch of the New York Central near St. Mary's Park in the Bronx, to run south on a steel viaduct across the Bronx kiln to Randall's Island; thence across Little Hell Gate to Ward's Island and thence to the Long Island shore at Astoria, continuing through Steinway and Woodside to Bushwick Junction on Long Island, about seven miles. Oliver W. Barnes is President and John McDonald Counsel of the company.

OHIO & KENTUCKY.—George Swartz has taken a contract, according to report, to grade 1½ miles in Breathitt County, Ky., on this line from Jackson, Ky., terminal of the Lexington & Eastern, to run northeast 26 miles through timber and mineral lands into Morgan County. R. M. Broas of Lexington, Ky., is Chief Engineer. (Dec. 15, 1899, p. 872.)

ONTARIO ROADS.—A company, of which Martin M. Todd of Galt is Vice-President, proposes to build a line from Galt on the C. P. R., northeast through Preston to Berlin.

OREGON SHORT LINE.—Work is reported begun on extensive improvements on the Idaho Division between Pocatello and McCammom. The grade is to be corrected and the track raised.

PENNSYLVANIA.—Surveys are reported in progress for a branch from Queen's Run, Pa., on the south side of the Susquehanna River to run west to the mouth of Tangascootac Creek.

Surveys are reported completed for the extension from Vintondale, Pa., west about 15 miles to Black Lick on the Indiana Branch. (Jan. 26, p. 64.)

PENNSYLVANIA & NORTHWESTERN.—Surveys are reported completed for a branch from Hillman, Pa., north via Big Run 15 miles to Falls Creek on the Pennsylvania.

PHILADELPHIA & READING.—Bids are asked until May 5 for the new Reading Belt around the city of Reading, Pa., involving about 7½ miles of new road. (April 20, p. 264.)

PITTSBURGH, BESSEMER & LAKE ERIE.—Surveys are reported in progress for a new line around Shenango Hill, Pa.

ST. LOUIS, KANSAS CITY & COLORADO.—The company will receive bids up to and including April 30 for grading, masonry and bridging on about 40 miles of the proposed extension from Union, Mo., to the west line of Gasconade County. Plans, profiles and specifications can be seen at the office of the Chief Engineer, 144 Laclede Bldg., St. Louis. All bids must be accompanied by check for $500 on some bank in St. Louis and payable to the Treasurer of the company. A bond will be required as security. Contracts will be let in sections from one to 10 miles and the company reserves the right to reject any or all bids. L. M. Fouts is General Manager and Chief Engineer. (Official.)

SALISBURG & HARVEY.—Mr. D'Arcy Scott of Ottawa is applying to the Dominion Legislature for an act to build a branch from Turtle Station, on the main line in Albert County, N. B., to run south to Baltimore; also to Moncton, Westmoreland County; also to Watters oil works. Power is asked to buy the Harvey Branch and the Alma & Harvey line.

SAN FRANCISCO & SAN JOAQUIN VALLEY.—The company has petitioned the San Francisco Board of Supervisors for a franchise for extensions within that city.

SOUTHERN PACIFIC.—New contracts are to be let, according to report, for the Mohawk Branch from Henderson, Ore., northeast 22 miles up the Mohawk River. Part of the work has been done under John S. Bays of Portland, Ore. (Dec. 22, 1899, p. 888.)

SOUTH SHORE.—Mr. Hugh H. McLean of St. John, N. B., is making application to the Dominion Legislature for an act to incorporate a company to buy the property of this company and to connect it with the Washington County Ry. in the State of Maine, which will require a steel bridge across the St. Croix River at St. Stephen, N. B. Permission is also asked to extend the road to connect with other railroads in New Brunswick, and to consolidate the South Shore with the Washington County.

STUTTGART & ARKANSAS RIVER.—See Railroad News column.

SWAN VALLEY & COLUMBIA.—John Broderick of Nashville, Tenn., is reported to have taken the contract for three miles of this line from a point on the Nashville, Chattanooga & St. Louis on Swan Creek, Hickman County, Tenn., to run east to the Louisville & Nashville at Carters Creek, Maury County. John A. Pitts of Nashville, Tenn., is President. (Dec. 22, 1899, p. 888.)

TEXAS ROADS.—The Elkhart, Mineral Wells & Improvement Co. of Palestine, Tex., will build a railroad from Elkhart to the Mineral Wells hotel, two miles east. Surveys are being made and the road is to be built this summer. Contracts will be let within 60 days. It will require very little earthwork and no iron bridges, but two wooden trestles. The company expects to complete the work by Aug. 1. H. L. Wright of Palestine, Tex., is Manager. (Official.)

VICTORIA MINES.—A bill has passed the Canadian Legislature to incorporate this company to build in the districts of Algoma and Nipissing from a point on the Canadian Pacific between Whitefish and Worthington; also from a point in the town of Garson to the Stobie Branch of the C. P. R. McPherson, Clark, Campbell & Jarvis of Toronto are the solicitors. (March 2, p. 146.)

WEST VIRGINIA ROADS.—A company has been organized at Fairmont to build a railroad from that city north via Rivesville to Fairview. T. W. Fleming is President; O. S. McKinney, Secretary, and A. Howard Fleming, Treasurer, all of Fairmont.

The business men of Fayetteville are reported to have taken up a plan to build a railroad from that city to Fayette Station, on the Chesapeake & Ohio. A. B. Preston and C. W. Dillon of Fayetteville are interested.

GENERAL RAILROAD NEWS.

ARKANSAS, LOUISIANA & SOUTHERN.—This property, according to report, has been sold to the Louisiana & Arkansas and the two roads which have been operated jointly for some time are to be consolidated. The A., L. & S. extends from Sibley, La., north 22 miles to Cotton Valley. The consolidated road extends from Stamps south 101 miles through Cotton Valley and Sibley to Salt Works, with a branch from Taylor, Ark., to Fomby. It is proposed to build extensions from Salt Works southeast to Natchez and south to Alexandria.

ARKANSAS SOUTHWESTERN.—The Southwestern Arkansas & Indian Territory has been reorganized under the above title, with the Receiver, J. A. Woodson, as Vice-President and General Manager. The property was sold at foreclosure March 13. (April 20, p. 264.)

ATLANTIC COAST LINE.—A special meeting of the stockholders of the Wilmington & Weldon and the Southwestern, held at Wilmington, N. C., April 20, the action of the Board of Directors was approved for the absorption of these properties into the Atlantic Coast Line System. The stockholders of the Atlantic Coast Line met at Charleston, S. C., April 21, and voted to consolidate the various properties now under control. (Jan. 27, 1899, p. 75.)

CALUMET WESTERN.—The stockholders have voted to increase the capital stock from $200,000 to $500,000. The road is being built in the interest of the Pennsylvania, the Chicago, Rock Island & Pacific, the Chicago Junction and the Michigan Central, from Hegewisch to South Chicago, and is to be completed by Aug. 1. (Railroad Construction, April 21, 1899, p. 531.)

CLEVELAND & PITTSBURGH.—Blair & Co., New York, are offering $1,500,000 of the new general mortgage 3½ per cent. gold bonds due Nov. 1, 1948, at 106 and interest. (March 9, p. 162.)

COLORADO MIDLAND.—The voting trustees announce that they have received from responsible persons an offer to buy the stock represented by voting trust certificates outstanding on July 2, 1900, at $30 per share for preferred stock, and $12.50 per share common stock. Under the terms of the voting trust agreement the voting trustees are empowered to sell such stock upon written consent of the majority in interest of stock trust certificates outstanding at the time of such sale. The trustees recommend the acceptance of the offer. Transfer books will be closed from May 18 to June 18. Voters are requested to send written approval of sale to the Central Trust Co., New York. Although not stated in the announcement, the road is to be acquired in the joint interest of the Colorado & Southern and the Rio Grande Western. (C. & S., March 23, p. 194.)

NEW YORK, NEW HAVEN & HARTFORD.—The company has sold to Kidder, Peabody & Co., $1,000,000 of the treasury stock which is offered for sale by the company. (Jan. 5, p. 14.)

The company announces the purchase of a control of the property of the New Haven Steamboat Co., which has been a competitor with the company for the business of the city of Providence.

PEORIA, DECATUR & EVANSVILLE.—Judge Allen in the U. S. Circuit Court at Springfield, Ill., on April 24 entered a new decree approving the sale of this property on Feb. 6 to the Central Trust Co., New York. (April 20, p. 264.)

SEABOARD AIR LINE.—The Richmond, Petersburg & Carolina, which has completed its line from Richmond, Va., north 103 miles via Petersburg to Rideway, N. C., has changed its name to the Seaboard Air Line Railway Co., as the parent company of the consolidation. It has filed a mortgage to secure $75,000,000 of 4 per cent. 50-year gold bonds. Of the new bonds, $11,244,000 are to be used at once; $18,500,000 will remain in the treasury for future uses; $24,066,000 is to be reserved to refund bonds of companies whose lines form part of the system; $12,500,000 is issuable after July 1, 1903, to acquire additional railroad properties and for improvements, extensions and equipment, and the remaining $8,690,000 is reserved to acquire stock and bonds of the Georgia & Alabama and the bonds of the Georgia & Alabama Terminal Co. The authorized capital stock of the Seaboard Air Line consists of $25,000,000 preferred and $37,500,000 common, of which a large portion is reserved for future uses. The Continental Trust Co. of Baltimore is trustee under the new mortgage.

President John Skelton Williams has made an announcement of the successful accomplishment of the formation of the new Seaboard Air Line System. He states that with the completion of the Richmond, Petersburg & Carolina and the 90-mile extension from Cheraw, S. C., to the junction of the Florida Central & Peninsular south of Columbia, the S. A. L. is the only road operating its own lines from Richmond and Baltimore to Jacksonville and Tampa, and that its route is materially shorter than any combination of other lines which can be formed. On the finances of the road he makes the following statement:

The new Seaboard Air Line Ry. controls 100 per cent. of the entire capital stock of 11 of the 18 railway companies comprising the System, and it owns between 90 and 100 per cent. of the entire capital stock of four more railway companies; between 90 and 95 per cent. of another, and between 75 and 85 per cent. of the stock of the Seaboard & Roanoke RR., a road 80 miles in length, in which latter road T. F. Ryan of New York owns a minority interest. . . .

Under our plan of consolidation the total amount of bonds outstanding on the combined System will be about $19,000 per mile, with $7,000 per mile of preferred stock, and $10,000 per mile of common stock, representing a lower capitalization than that of any System in the United States with equal mileage; the total amount of bonds and stock outstanding being about $36,000 per mile of road owned, or about one-half of the capitalization per mile of road owned by the Seaboard's principal competitor, the Southern Ry. The total amount of stock outstanding on the new Seaboard Air Line System will be about $44,000,000, being very little more than the present aggregate capital stock of the 18 roads at present comprising the System, which old stock will, of course, be retired. . . .

The actual aggregate gross earnings of the several properties composing the new Seaboard System for the 12 months ending March 1, 1900, exceed $9,450,000. Net earnings, after the payment of operating expenses and taxes, exceed $2,660,000, and the fixed charges on the system for the same period, including interest on all outstanding bonds and rentals, amount approximately to $1,460,000, leaving a net surplus for the 12 months over and above interest charges of $1,200,000.

Interest charges on the entire amount of new 4 per cent. bonds which are to be issued under the plan of consolidation will amount to only about $700,000. It is thus seen that without making any allowance for the 200 or 300 miles of new road which are to be opened for business in the next few days, and without making allowance for the increased earnings and reduced expenses which will naturally follow the linking together into one compact system of the 18 heretofore disjointed railroads comprising it, that the earnings of the past 12 months are enough to take care of the interest on all the new bonds to be issued, and yet have a margin of $500,000, or sufficient to pay 3 per cent. on the entire amount of new preferred stock to be issued under the plan of consolidation. (April 20, p. 264.)

STUTTGART & ARKANSAS RIVER.—This property was sold again at public auction by C. C. Waters, Master in Chancery, at Stuttgart, Ark., April 16, to John T. Hicks of Searcy, for $50,000. Mr. Hicks is Superintendent of the Searcy & Des Arc, which is to be consolidated with the purchased road, with a new connecting line from Stuttgart to Des Arc, 35 miles. (April 6, p. 228.)

WESTERN NEW YORK & PENNSYLVANIA.—The directors of this company on April 23 approved of the offer of the Pennsylvania to take over a controlling interest in this company. The proposition is to pay 18 per cent. of the par value of the $20,000,000 capital stock, and 30 per cent., or $300, for each bond of the $10,000,000 issued of income mortgage bonds. This price is higher than has heretofore ruled for these securities on the Exchange. The W. N. Y. & P. comprises 633.39 miles, including 45.48 miles operated under trackage contracts. The purchase by the Pennsylvania will give that company its desired entry into Buffalo, as well as extensive terminals in that city, and will do away with the necessity of building the proposed Pennsylvania & Buffalo Connecting line. Deposits of the stock and income bonds must be made on or before May 26 with the Commercial Trust Co., Philadelphia, Pa.; Speyer & Co., New York City, N. Y.; Speyer Brothers, London, Eng.; Laz. Speyer Ellissen, Frankfort-on-Main, Germany, or Teixeira De Mattos Brothers, Amsterdam, Holland. (Railroad Construction column, March 23, p. 194.)

WHEELING BRIDGE & TERMINAL.—In the U. S. Circuit Court at Wheeling, W. Va., an order has been issued in behalf of the Washington Trust Co. New York, to sell this property about July 1. (Feb. 23, p. 128.)

WISCONSIN CENTRAL.—A contract has been made, according to report, with the Great Northern, which gives the Wisconsin Central the use of the tracks of that company for 99 years between St. Paul and Minneapolis. The W. C. has bought Boon Island in the Mississippi River and a strip of land in Minneapolis to be utilized as freight terminals.